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Congress

THE Mayor of Torquay, COUNCILLOR W. H. WHITE, J.P., has sent the following message of welcome to the delegates who, by the time these words are read, will be assembling for the Association's 72nd Annual Congress.

"Torquay is very pleased indeed to have been chosen as the venue for the Annual Congress of the British Veterinary Association from September 20th to the 25th next and, on behalf of the Council and the Town, I extend to you a most cordial welcome.

"I hope that your deliberations at Torre Abbey Mansion House will prove to be of benefit to everyone present, and even to those members of the Association who are prevented from attending, and will help forward the splendid work which is being done by your profession for the community as a whole."

Congress is the time of stocktaking. The Association's own affairs are traditionally reviewed by the PRESIDENT, while some of the main lines of progress in veterinary science and practice are indicated in the Papers. This year, for the first time, there are to be, on certain days, alternative sessions so that delegates may choose between Papers on different subjects. So wide has the scope of interest become that only thus is it possible to try and satisfy all interests. At later dates every paper, with its relevant discussion, will be published in THE RECORD so that a choice between alternatives will mean only the temporary missing of information.

Even a cursory glance at the programme shows the astonishing diversity of subject matter now the proper study of the veterinarian. Research in the various branches of our own science is of comparatively recent growth. DR. RUSSELL GREIG, who is about to retire from the Directorship of the Moredun Institute, has observed that even as lately as the 20's of this century "veterinary research was largely sporadic and free-lance in character." During the years of his own distinguished contribution to it such research, and the literature which derives from it, has penetrated a hundred fields, has elicited a vast body of information, and continues with growing intensity.

Veterinary surgery is a world-wide science, and no stock-taking could be complete without reference to the courageous and patient work of those, both scientists and practitioners, whose lives are spent in remote areas, often cut off for long periods from the pleasure and stimulation of professional companionship. No one, reading between the lines of communications received from these distant workers can fail to be moved to admiration at once by their fortitude, and by the altruistic desire for the increase of knowledge, which their efforts attest. We published recently a note on the award of a Fellowship, R.C.V.S., to MR. DARNE for a thesis on Ochronosis, prepared during a time when he was "cut off from all opportunity of discussion with

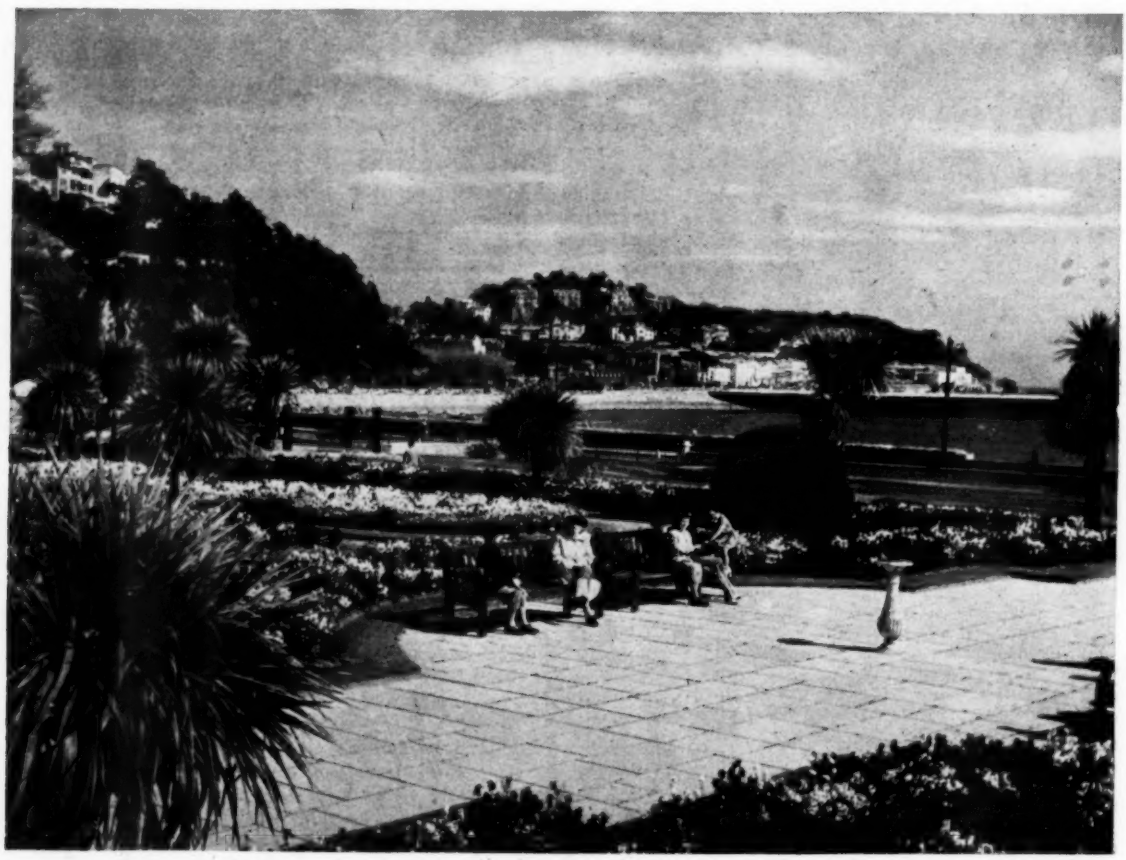
other members of his profession, with no library to consult, and no laboratory to use." Such workers earn not only prestige for themselves, but reflect it upon the entire profession.

Work of lasting value carried out in distant places must recall the name of the late DR. J. T. EDWARDS, whose fellow-countrymen are launching an appeal (printed on page 547) for a Memorial Fund to perpetuate the name of their great colleague. It is to be hoped this Fund will be liberally subscribed so that the permanent scholarship which it is proposed to endow may be awarded before too long.

For many who will be present, the greatest attraction of Congress lies in the opportunity it provides to meet friends, old fellow students, and scientific colleagues who have become scattered about the country. Not only are such social exchanges valued, but it may be suggested that in personal conversation and debates experiences and information are exchanged of hardly less value than those imparted at the formal sessions. Congress is a time of professional refreshment, and serves a purpose no other function could comparably do.

It has seemed to the Editorial Committee appropriate to present to members of the Association, at this time, the new and modernised format of THE VETERINARY RECORD. It is hoped the changes made will give general satisfaction. There will be two further Congress Issues. That of next week will contain accounts of the At Home, given by our hosts the Western Counties Division to-morrow (Sunday), and Monday's Civic Welcome by the Mayor of Torquay, the official opening by EARL FORTESCUE, and the Civic reception in the evening. The third and last Congress issue will contain accounts of the PRESIDENT'S Address to the Association, the Annual Banquet, the Annual General Meeting and such social functions as can be accommodated. There will be, in addition, of course, the customary general and scientific content of the journal.

All members of the profession will combine in wishing success to this year's Congress for which so much work has been done by the Western Counties Division. We feel sure that the result of their endeavours will be to make every delegate repeat the axiom laid down by the immortal Weller for the successful composition of love letters and " vish there wos more of it."



THE ABBEY GARDENS, TORQUAY

SYMPOSIUM

Modern Trends in Veterinary Therapeutics

R. J. FITZPATRICK : D. OGILVIE : G. C. BRANDER : J. T. ABRAMS : B. A. CROSS : J. R. HUDSON : H. BURROW

The following Papers are abridged versions of those delivered at a Symposium, having the title above, arranged by the Association of Veterinary Teachers and Research Workers

Introduction and Pharmacological Review

BY

R. J. FITZPATRICK

THE diversity of approach to the present-day problems of therapeutics is very wide, and is reflected in the range of contributions to this meeting. In each case the subject is one which has seen great advances in the post-war years. None of us, as individuals, can hope to achieve familiarity with all branches of therapy, and this meeting presents us with a welcome opportunity to review many technical advances and, more particularly, to assess the current approach to problems other than our own.

As a pharmacologist I am aware of the accumulation of a vast amount of published work related to my own interests but on which I would like expert interpretation. As specific examples I can refer amongst other things to new knowledge of vitamins (A, E, D, B_{12}) ; of minerals (copper and cobalt), of hormones, especially the adrenal cortex, pituitary and sex hormones ; and of parasiticides both with regard to the development of new compounds and their pharmaceutical formulation. There are also advances in the understanding of diseases which reflect changes in therapy, as with ketosis.

Some of these subjects will, I hope, be discussed by our speakers, but it is obvious that in the time available none will be able to cover more than a fraction of his ground. We can expect, however, that as well as discussing specific developments they will also give us real insight into the prevailing attitude within their own field of specialisation. In this lies the greatest value of our meeting.

Pharmacological Review

Pharmacology is a science of recent origin and has no well-defined limits, encroaching into pure chemistry and biochemistry on one hand, and into pathology and clinical medicine on the other. It is not surprising, therefore, that major contributions to the subject are constantly being made by many workers—biochemists and bacteriologists, for instance, who would never consider themselves as pharmacologists.

To-day I shall confine myself to discussing three types of advance in pharmacology : new synthetic drugs, the antibiotics, and the further study of established drugs.

New Synthetic Drugs

There has always been a close association between the organic chemist and the pharmacologist and no doubt this will continue indefinitely. The past decade has seen steady advances produced by this association. However, the approach of workers in this field is not always understood by outsiders and is worthy of further comment.

One can distinguish three approaches of the pharmacologist and chemist to the synthesis of new drugs.

(1) Occasionally new types of compounds are introduced exploiting principles widely known in chemistry but not previously applied to medical problems. Recent advances of this nature are the use of silicones as antifrothing agents in bloat ; or the introduction of ion-exchange resins as orally administered diuretics in oedemas.

(2) It is, however, more usual for the chemist to be requested for preparations which mimic the chemical structure of substances of known pharmacological activity. Sometimes this involves the extraction, analysis and re-synthesis of naturally occurring substances, as illustrated by recent syntheses of chloramphenicol and adrenal cortex steroids, and, very recently, the synthesis of the oxytocic principle of the posterior pituitary (Du Vigneau *et al.*, 1953).

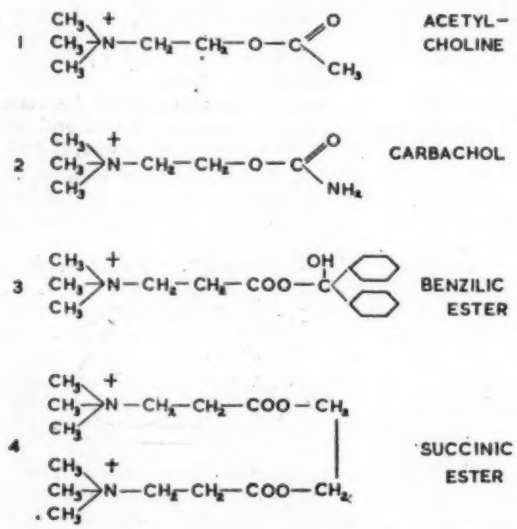
More often the chemist copies the structure of an existing drug, and by juggling with the molecular structure aims to eliminate undesirable actions whilst retaining or augmenting desirable properties. This field of investigation has been fruitful in the recent past, yielding, for instance, synthetic oestrogens, new local anaesthetics, and new C.N.S. depressants.

(3) The third approach is really an extension of the second but is sufficiently important to receive separate discussion. This exploits the concept of competitive drug antagonism which has grown to become one of the dominating influences in post-war pharmacology both with regard to the elaboration of new drugs and the fundamental study of the precise mode of action of drugs on cells.

Here the aim is usually to synthesise a " false " drug which has a chemical structure so similar to a " true " drug (usually a naturally occurring substance) that it will compete with it for cell receptors or enzymes. The

"false" drug, however, cannot proceed fully along the usual metabolic pathway of the "true" drug and the cell is denied the final product of that stage of metabolism. This interference is in some cases harmful to the cell, as with sulphonamides, and in others protective, as when British-anti-Lewisite is used to antagonise poisoning due to arsenic and certain other substances.

Our present knowledge of the pathogenesis and treatment of allergic conditions and certain types of shock owes a great deal to pharmacological research. For some time it has been known that histamine occurred normally in healthy tissue cells and could be liberated by various noxious procedures (for review see Rocha e Silva, 1951) including, it now seems, the administration of many drugs, such as curare, dextran and morphine. Clinical histaminoses were initially treated sympto-



matically, *e.g.*, with sympathomimetic amines but this has now been largely replaced by the competitive antagonists of histamine, which usually block the action of histamine on target organs without producing serious side effects. In turn these drugs are being used as laboratory tools in the detection and identification of potent substances liberated into body fluids under pathological conditions.

Another notable example of competitive antagonism has become of clinical importance recently, although the underlying antagonism has been known for more than 10 years (McCawley, Hart & Marsh, 1941). This is the use of N-allyl-nor-morphine ("Nalorphine") to combat the toxic effects of morphine. As their names indicate the two drugs are very similar chemically, and in fact have some similarities in action. When, however, "Nalorphine" is used as an antidote to morphine, the active molecules of morphine are displaced by the relatively inert ones of "Nalorphine" and the respiratory depression and other symptoms are reversed.

The four choline esters shown in the figure elegantly illustrate the merging of the pharmacological principles of mimicry and antagonism.

Acetylcholine (Compound I) is responsible for impulse transmission at the end of parasympathetic nerves (muscarinic effects), and also in autonomic ganglia and at the neuromuscular junction in skeletal muscle (nicotinic effects).

Carbaminoyl choline ("Carbachol"), Compound 2, is a drug designed to mimic the actions of acetyl choline and this it does, having in addition the therapeutic advantage of prolonged action due to resistance to body cholinesterase. Acetyl-β-methyl choline ("Mecholyl") is another close homologue with similar clinical uses to carbaminoyl choline.

As the acidic components of these esters is made "larger" the mimetic properties are decreased, and instead, antagonistic properties are revealed. The Benzilic ester (3), for instance, possesses atropine-like properties and blocks the muscarinic actions of acetyl choline on parasympathetic target organs: Succinyl choline (4), on the other hand, is used clinically as a neuromuscular blocking agent, *i.e.*, an antagonist to the effect of acetylcholine on skeletal muscle and has some advantage for this purpose over curare derivatives and the new decamethonium compounds.

Antibiotics

The most spectacular advances in therapy have been associated with the development of the antibiotics, and it would seem necessary, therefore, to discuss them in a pharmacological review. In point of fact most of the work has been outside the scope of the pharmacologist and I shall briefly mention only points of current interest.

General

The number of antibiotics now available has already become something of an embarrassment in that we have not yet fully appreciated all the potentialities and limitations of earlier members of this group. At present one must adopt new products cautiously. The only reliable criterion of usefulness is adequate clinical trial preferably when diagnosis is established objectively as well as subjectively. Laboratory assessment of new antibiotics by *in vitro* tests, must be accepted only as a preliminary screening. Before adoption the new drugs will need to possess advantages over the established drugs either in range of activity or in other respects such as convenience of administration, price, toxicity, drug resistance and so on.

Mode of action

In the last few years a great deal of work has been published describing the biochemical lesions produced by antibiotics. The position is confused in that most agents can interfere with bacterial metabolism in a variety of ways, in most instances by producing inhibition of specific enzymes. Many claims can be disregarded at present in that the gross antibacterial activity of a drug does not parallel the antienzyme activity. For instance, some of the biochemical lesions are produced only with much higher concentrations of antibiotic than are necessary to inhibit bacterial growth. Adopting such criteria as those proposed by Umbreit (1953) and by Gale (1952; 1954) the more important actions of antibiotics are being revealed by the biochemist.

It appears that although most antibiotics act primarily on enzyme systems, some such as tyrocidin and the polymixins, produce an adverse permeability of the

bacterial wall which prevents the organism concentrating essential nutrients such as amino-acids.

Other antibiotics act on energy releasing metabolism ; gramicidin, for instance, inhibits the energy-rich phosphate (A.T.P.) mechanism, and streptomycin inhibits a stage of metabolism approximately equivalent to the citric acid cycle.

Terramycin, aureomycin and chloramphenicol are thought to produce their effects by depressing protein synthesis from amino-acids. Penicillin and bacitracin act, at least in part, by inhibiting the synthesis of nucleic acids and that part of amino-acid and protein metabolism which is associated with nucleic acids.

Although these views represent trends rather than established principles they are of great importance, and will eventually have impact upon therapeutics, perhaps by aiding the synthesis of new specific enzyme inhibitors or perhaps by indicating the most rational combination of more than one antibacterial agent.

Use of Penicillin

For many years now it has been stated authoritatively that to be effective penicillin should be given in a suitable (depot) form or at appropriate high frequency to maintain a concentration in the blood stream at or above bacteriostatic values.

There is evidence, however, showing that if the blood concentration is allowed to fall intermittently below minimum bacteriostatic values, no drop in the efficiency of treatment occurs (see Florey, 1952). This may be explained eventually in terms of the distribution of penicillin in blood and tissues. It is known that injected penicillin persists in tissues (*e.g.*, liver, bacterial cytoplasm) longer than in blood (Ercoli *et al.*, 1948 ; Schachter, 1948 ; Grunberg *et al.*, 1948) ; and in inflamed tissue, this persistence is even greater than in healthy tissue (Ungar, 1950). The significance of earlier work based on the maintenance of blood concentrations is diminishing.

Established Drugs

Advances in pharmacology have not been confined to the development of new drugs. Established drugs have been re-investigated and shown to have properties not previously understood, and in the veterinary field some drugs of importance in human medicine have been critically evaluated in domestic animals.

Procaine, for instance, has long been known as a local anaesthetic. It is also now known to have an analgesic action of use in pruritis and burns ; it antagonises the sulphonamides and histamine, and it produces a quinidine-like slowing of the heart.

Ergot alkaloids long known as oxytocics have received fresh impetus in human obstetrics from the development of dihydro-ergotamine which is thought to be capable of relaxing cervical spasm without blocking the rhythmic contractions of the parturiant corpus (Sauter, 1948). Differences between the reactivity of cervix and corpus to drugs are also known to exist in ruminants (Fitzpatrick, 1951) and may well be exploited in the future.

The sulphonamides have been re-evaluated objectively in domesticated animals. J. Francis (1949), and others, have systematically investigated the absorption and excretion of most of the sulphonamides in domesticated animals. At the same time other workers have shown that in all species the various sulphonamides differ markedly in their distribution in the blood and tissues. For instance, highly ionised substances like sulphathiazole and sulphadiazine are loosely bound to plasma protein, whereas poorly ionised members like sulphonilamide and sulphacetamide are not bound and may diffuse very well into body cells. These several investigations have given a fresh basis for judging the relative merits of each sulphonamide in each of the species concerned.

The last examples of drugs about which new knowledge has recently been acquired is posterior pituitary extract. This preparation in the past has been used by veterinary surgeons to stimulate smooth muscle of the bowel and of the uterus, and for the initiation of milk " let-down." Among recent developments of our knowledge of this preparation is the revelation by Alexander (1952a & b) that in the horse, unlike other species, pituitrin may produce *inhibition* of the smooth muscle of the gut. Another point which, unfortunately, is not yet widely appreciated by veterinary surgeons is that this drug, by virtue of its vasopressin content, may cause generalised vasoconstriction including fatal constriction of the coronary vessels. The use of the whole extract has fallen into disrepute in human obstetrics because of the fear of " pituitrin shock," and oxytocic fractions only are used.

The action of the fractions of pituitrin on the uterus of ruminants has recently been investigated quantitatively by the author. Their stimulant action is markedly potentiated under various conditions including parturition, to such an extent as to suggest that the dosage conventionally used in obstetrics is grossly excessive and may well lead to conditions of inco-ordination of the uterus and cervix which would justify the adverse criticism which has often been levelled against the drug. In threshold doses oxytocin has been shown actually to facilitate co-ordination of the pregnant uterus (*i.e.*, contraction of corpus with relaxation of cervix) at least in humans (Fitzpatrick, Nixon & Schild, 1951) and better use may follow in veterinary practice with less heroic doses than are usually recommended.

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Parasiticidal

BY

G. C. BRANDER

ALL of you will be aware of the great strides that have been made in the control of bacterial disease by the use of the sulphonamides and the new antibiotics, but the fact that similar advances have taken place in the field of parasite control may not be realised.

The insecticide and anthelmintic field covers a very wide range of drugs so in this short period I have confined myself to mentioning a few of each, and outlined some considerations which are of major importance in any study of their efficiency.

Insecticides

Before the war and the discovery of DDT, the insecticides in general use for the control of parasites on animals were arsenic and its compounds, sulphur, phenol, pyrethrum, nicotine, sodium fluoride and derris, and each in its way, when properly formulated, gave a useful measure of control of many parasitic conditions. Most of these insecticides, however, had drawbacks in that the majority had no residual effect, and many of them had to be used very near the toxic level. The loss of derris due to the war, and the introduction of DDT by the Swiss stimulated research into related chemicals, which might have a similar action. As a result a continuous stream of potential insecticides are described each year, and in some cases new ones are reported each week.

The list of insecticides in general use to-day is formidable, so I have confined myself to mentioning some of those commonly used on animals. They are DDT, benzene hexachloride, and its purified gamma isomeric form (Lindane), Toxaphene and Aldrin and Dieldrin.

Dicophane—DDT ($C_{14}H_9Cl_5$)

The technical product in general use consists of about 70 per cent. of the para para isomer which is the insecticidally active portion of the chemical.

DDT is practically insoluble in water, but is insecticidally effective at very low concentrations. Although slow in action it has remarkable residual properties.

It acts on insects mainly as a contact poison, and is highly effective against many varieties of flies, and against lice, fleas, ticks and keds found on animals. It is used for treatment as a dusting powder, a suspension in water, and sometimes dissolved in oil.

Benzene Hexachloride—BHC ($C_6H_6Cl_6$)

Contains five isomers of which the gamma isomer is the most active insecticidally. It is practically insoluble in water.

It is more toxic to insects than DDT, but because of its volatility it has a shorter residual effect. Its action is very similar to DDT, but in addition to its contact action, it acts as a stomach and fumigant poison. It kills more rapidly than DDT and, in addition to its action on flies, lice, fleas, etc., on the whole is more effective against ticks and mites than DDT, and also has a more pronounced larvicidal action.

Lindane—99 per cent. Gamma Benzene Hexachloride

This material is used where it is important to have a formulation which will not give the musty odour associated with the cruder benzene hexachloride. It is also used more commonly where oil solutions of the insecticide are required.

Toxaphene ($C_{10}H_{10}Cl_8$)

This is a waxy substance soluble in most organic solvents. It is slow in action, but has proved an outstanding insecticide against cattle ticks having a longer residual action on cattle hair than most other insecticides.

Aldrin and Dieldrin

Insecticides which have been introduced during the last two years, and which show great promise in the control of maggot fly. Although their action against the adult fly is not so great as DDT, they have a very effective action on the larval stages, with a long residual action in the fleece.

All the above insecticides have what in the bacterial field would be described as a wide spectrum, *i.e.*, they are efficient against a wide range of parasites.

The complete development of these insecticides for use on animals has stimulated the growth of fairly elaborate testing centres for their general investigation. Insecticides have to be considered from several points of view :—

(1) Formulation

The chemical can be prepared in powder form for dusting or for suspension in water, in emulsion form or as a solution in oil. The method employed will obviously depend on (*a*) the relative solubility of the drug, (*b*) the type of animal to which the insecticide is to be applied and (*c*) the method of application. For instance, a suspension suitable for the dipping of sheep will not always be satisfactory for the treatment of a cat.

(2) Toxicity

The L.D.50 for small animals has to be determined for each new insecticide before it can be applied to the larger animals. To determine this, experimental animals are given graded doses of the insecticide by mouth, and also treatments which simulate dipping or spraying. Despite such trials the final toxicity hazard has to be worked out for each domestic animal, as insecticides vary considerably in their effect on different animals.

(3) Residual effect

This varies according to the insecticide used and the coat of the animal. BHC, DDT and Dieldrin for instance, will last in the fleece of sheep for several months, but the same insecticides in the same type of formulation will disappear from the hair of cattle in three or four days.

(4) Resistance

This is a complex problem and although it has been found for instance that flies can become resistant to DDT fairly rapidly, under practical conditions they

have not, as yet, become resistant to pyrethrum. Ticks which are resistant to arsenic and BHC, have not yet been found to be resistant to DDT.

In addition to determining these fundamental points each insecticide has to be tested on the various domestic animals to determine the effective concentration for general use. This will depend upon :—

(*a*) The parasite which is to be controlled,

(*b*) The animal to which the treatment is to be applied, and

(*c*) The frequency of application.

It will be seen therefore that although new insecticides may be synthesised in rapid succession it is frequently a long process before an insecticide can be recommended for general use on animals, and it is very important to ensure that the method of formulation employed is the most suitable for each animal.

Anthelmintics

In general the modern anthelmintics are superior in efficiency, more specific, and often less expensive than some of the older drugs such as Areca nut, Santonin, Kamala, Oil of Chenopodium, the arsenicals, carbon tetrachloride, copper sulphate, nicotine sulphate, turpentine, etc. The aim nowadays is to produce a drug which will have a high efficiency and a low toxicity.

Several new anthelmintics have been described during the last 15 years and amongst these one can mention phenothiazine for strongyle control, hexachlorethane for liver fluke, diethylcarbamazine acid citrate for ascarids and filaria, dichlorophen which has the property of disintegrating tape worms in the intestinal tract, and hexylresorcinol for ascarids.

When searching for anthelmintics one has to consider worms of what one might call two classes, (*a*) those worms which live in the alimentary tract and (*b*) those which live in the blood stream and other tissues of the host. Generally speaking, when the purpose is to destroy worms in the gut a drug must reach the portion of the intestine in which it is desired to act without being absorbed. Should it be absorbed, however, it must not produce toxic reactions in the host. In addition, a good anthelmintic should be effective at a low concentration and should not induce nausea, or any undue physiological reaction in the treated animal.

It seems probable that many of the present anthelmintics will eventually be replaced by drugs which are host specific and are so formulated that the active principle is released at the correct site of action.

In conclusion there is one point I wish to make both about insecticides and anthelmintics, especially in view of the present standard of research into these drugs, that where deaths are associated with the use of one or other of these drugs, the veterinary surgeon should be very sure of his *post-mortem* findings before placing the blame on the treatment. A complete toxicological study on animals has been carried out with most of the new preparations, and when used at the recognised dilutions or doses fatalities are most unlikely.

I have appended a list of the insecticides which are used commonly in this country and overseas for the treatment of the various external parasites of animals, and for anthelmintics I would refer you to the comprehensive list which is given in the new *British Veterinary Codex*.

Insecticides Commonly Used in this Country and Overseas

Cattle

Ticks.—Toxaphene, benzene hexachloride, chlordane, arsenic, DDT.
Mange Mites.—Lindane, BHC.
Warble Fly.—Derris.

Sheep

Ticks.—BHC, DDT, Toxaphene.
Mange Mites, Keds, Lice.—BHC.
Maggot Fly.—Dieldrin, DDT.

Pigs

Mange Mites and Lice.—BHC, Lindane.

Poultry

Lice and Mites.—Lindane, Nicotine sulphate.

Dogs

Fleas and Lice.—Derris, BHC, DDT.
Ticks.—Derris, BHC.
Mites.—BHC, Benzyl benzoate.
Demodectic Mange.—Rotenone.

Nutritional

BY

J. T. ABRAMS

VETERINARY practice takes place against a constantly changing agricultural background. Changes of husbandry produce new imbalances of nutrition for livestock and new patterns of seasonal variation in the availability of nutrients. For these reasons it seems desirable not to discuss one of the completely new aspects of therapy, as, for example, the inclusion of antibiotics in animal feeds, but to take established problems in animal nutrition and see what changes time has wrought. One such example might well be that of vitamin D—calcium—phosphorus relationships, and a second that of vitamin E.

Vitamin D is perhaps unique among nutrients in owing its natural origin to solar irradiation. In plants it appears, though by no means conclusively so, that vitamin D arises from the action of sunlight on dead, rather than green, foliage ; in animals synthesis probably occurs in the first mm. depth of the skin, which makes the thick-fleeced sheep an interesting physiological phenomenon, and prompts questions as to the effects of skin disease on vitamin D synthesis in the animal body. Recent work shows that the intestinal epithelium is the site of formation of the precursor of vitamin D and here again one can speculate on the influence of intestinal parasites upon the vitamin D supply of animals.

In vitamin D therapy one is concerned with the magnitude of adequate dosage and the field problem is complicated, firstly, by the ability of animals to store vitamin D and secondly by the effects of changes of dietary intake of calcium and phosphorus upon the rate of use of vitamin D. Having said this, one asks whether any *field* problem relating to vitamin D and livestock in Britain exists.

Sheep

The use of vitamin D to prevent or alleviate " bent-leg " in lambs in W. Scotland is not new but Dunlop's (1954) observation that " bent-leg " is still to be found, especially in *forward* lambs, is noteworthy. More interesting, perhaps—certainly more difficult—is the diagnosis of vitamin D deficiency in lambs, since observers have shown that sometimes the only signs of avitaminosis may be sub-clinical rickets or perhaps reduced growth rates. As to dosage, although 25 i.u. per animal per day suffices in certain cases, something like 20,000 i.u. may be necessary when intakes of calcium and phosphorus are less favourable. There is here much opportunity for field research.

Cattle

Of cattle one may say that rickets has frequently been observed in various parts of Britain. Since the disease might be due to vitamin D deficiency, or phosphorus deficiency, or dietary calcium-phosphorus imbalance, its aetiology can be obscure.

Hignett and his collaborators (1950) have produced data suggesting that bovine fertility diminishes as calcium-phosphorus imbalance increases. In this connection the experiments of Wallis (1938) are important, for this worker seems to have been the only one who took steps to see that his animals were depleted of their bodily reserves of vitamin D before beginning his tests. The depleted cows, on the administration of vitamin D, changed from exhibiting large dietary negative phosphorus balances to showing large positive ones. Concerning breeding records for the animals Wallis said " The regularity shown by these (pre-test) records stands out in striking contrast to the fact that none of these cows showed estrum during the period of vitamin D deficiency."

In an attempt to determine whether British cattle are deficient in vitamin D supplies, the speaker (1952) estimated the daily uptake of vitamin D through direct solar irradiation to be at the most about 7,000 i.u. This relatively low figure suggested the possibility of vitamin D deficiency in cattle during winter. Such a hypothesis is supported by Hignett's survey (1953) which showed a more pronounced association between low fertility and Ca/P imbalance in the late, as compared with the early, winter months.

Earlier in this talk, reference was made to changing patterns of agriculture and their effects upon nutritional imbalances and hence upon dietary therapy. Hignett has stressed the increase in British dietary Ca/P ratios for cattle during the last two decades, an increase which has been associated with (*a*) increased liming of land, with the encouragement of calcium-rich herbage and (*b*) diminished consumption of phosphorus-rich oil-seed cakes. Furthermore, sun-cured hay, rich in vitamin D but deficient in carotene has tended to be replaced by carotene-rich, green hay of low vitamin D content. Dried grass and green silage, both foodstuffs of high carotene but low vitamin D content, have found increasing use in cattle rations. The significance of these changes is to be seen in the recent report that the anti-vitamin D factor of green fodders appears to be carotene (Grant, 1953).

Vitamin E in Animal Nutrition

Turning now to the functions of vitamin E in animal nutrition, the recent analyses of Brown (1953) show the general poverty of (*a*) *autumn* grass, (*b*) hay, (*c*) roots, and (*d*) cereal grains in vitamin E content. On the other hand *spring* grass is a good source of the vitamin. Such variations clearly have a seasonal significance in animal feeding. Since, however, livestock can store vitamin E in their own bodies, a seasonal deficiency need not necessarily affect animals in the field.

Nevertheless, United States workers have described muscular dystrophy in lambs " fed on dry lot " and Blaxter (1953) in Britain has shown that skim-milk feeds, supplemented by too large dosage with cod-liver oil, can produce the same disease in calves. Protection can be provided by vitamin E supplements. In the British experiments, the fatty-acid fraction of cod-liver oil has been found to be toxic. Other fats, especially rancid, *i.e.*, oxidised, ones may lead to increased animal requirements for vitamin E, which is known to have anti-oxidant properties. Young animals, on diets low in vitamin E, thus lack anti-oxidants.

Now vitamin C also possesses anti-oxidant characteristics. Its presence in fresh milk, therefore, may be significant for the life and health of young mammals, particularly on low-fat or rancid diets almost devoid of vitamin E. It has usually been assumed, however, that dietary vitamin C is needed only by primates and guinea-pigs but recent reports by Reyniers (personal communication) that in particular circumstances the young rat does indeed require a supply of the vitamin in the early days of its life, suggests the need for a reinvestigation of the ascorbic acid needs of very young, farm mammals.

Blaxter's search for, and discovery of, muscular dystrophy on farms where the winter feed was of low vitamin E content serves to introduce the relationship of avitaminosis E to infertility in large animals. After early work on the influence of vitamin E to rat fertility had suggested the application of the vitamin to problems of bovine infertility, Vogt-Muller (1934) claimed therapeutic successes in the treatment of infertile cows. He failed, however, to use a control group of undosed cows and his results have tended to be dismissed as being open to question. The experiments of Gullickson (1949), showing that after 30 services there followed no less than 25 conceptions and the birth of 19 *normal* calves from cows on reputedly vitamin E deficient diets, served to emphasise this unfortunate impression that vitamin E has little relationship to bovine infertility. On the other hand, since Blaxter has reported the production of muscular dystrophic calves from apparently unaffected dams, the lack of symptoms in both cows and calves in Gullickson's experiments leads to serious doubts concerning the efficiency of the latter worker's techniques in producing animals and diets depleted of vitamin E. These doubts are confirmed by comparisons of bovine blood-vitamin E concentrations in the U.S. and in Britain. In Gullickson's " deficient " animals (U.S.) they were " higher than those found in normally healthy cattle in Britain and Holland " (Blaxter). In the view of the speaker the relationship of bovine fertility to vitamin E supply is ready for reinvestigation. Twenty years ago, Vogt-Muller wrote, " Cows exclu-

sively on meadow pasture throughout the summer seem to need more vitamin E than cows kept on field pasture with clover." Bearing in mind, firstly, the potentially hay-like nature of meadow pasture at the end of summer, secondly, the poverty of hay in vitamin E content, and thirdly, the richness of clover in vitamin E, Vogt-Muller's observation has point.

In conclusion it may be said that modern veterinary therapy is not limited to the use of new drugs but necessitates constant review of the use of older therapeutic substances in the light of changes of animal and crop husbandry. In nutrition, inter-species comparisons can be hazardous ; and so can intra-species contrasts if different countries and practices are concerned. Diagnostic difficulties in the field may be increased by the ability of animals to store some nutrients but not others, and by increased rates of usage of specific nutrients through imbalances of still further dietary factors.

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From Glands

BY

B. A. CROSS

MANY potent hormone preparations are becoming available for use by the veterinarian, and it may be appropriate here to consider some of the basic principles of endocrine physiology bearing on rational therapy. The misuse of hormones may have grave consequences, yet there is a tendency to resort to them in any half-diagnosed functional disorder. But hormone therapy is so uncommonly effectual that we should probably profit from a greater concentration on the large gaps in our present knowledge.

Hormone treatment is directed at one of two ends. The first utilises some pharmacological action of the drug, *e.g.*, oestrogen implants for caponising cockerels. The second aims at restoring some metabolic or reproductive upset thought to be due to deficiency or excess of one or more endocrine secretions. Here the effect sought is " physiological " as with insulin treatment of diabetes mellitus or thyroxine in hypothyroidism.

There are four commonly accepted criteria by which an endocrine function may confidently be attributed to an organ or tissue :—

(1) Experimental removal of the gland must produce a characteristic and reproducible set of deficiency symptoms.
(2) Extracts of the gland (or implants or transplants) must produce amelioration or reversal of these symptoms.
(3) The active principle in the extracts should be isolated, identified chemically and if possible synthesised.
(4) The presence of the hormone should be demonstrated in body fluids (preferably venous blood draining the gland) following a natural stimulus to its secretion.

It need scarcely be emphasised that on the basis of these rigorous criteria we have little knowledge of the endocrine activities of domesticated animals other than the dog. It is also clear that a hypofunctional endocrine state cannot be diagnosed solely on an apparent clinical improvement following hormone therapy. Success with thyroid treatment in canine alopecia, or ACTH in bovine ketosis, might result from the pharmacological effects of the hormonal preparations used rather than a physiological replacement.

When a causal relationship is established between an endocrine gland and some physiological function, there remains the task of systematically studying all the phases of this relationship. For convenience of discussion they may be listed in functional sequence as follows :—

(1) Control of the endocrine secretion (*a*) nervous (*b*) humoral.
(2) Secretion, comprising (*a*) synthesis (*b*) storage (*c*) release.
(3) Circulating hormone.
(4) Target organs or tissues and effects produced.
(5) Mechanism of action of the hormone in target tissues.
(6) Destruction and/or excretion of hormone.

The remainder of this paper will be concerned with some of the recent advances in our knowledge of these six phases of endocrine function and of possible therapeutic implications.

There is now much evidence for the importance of neural mechanisms in the control of endocrine organs, particularly the pituitary gland (Harris, 1951). The parathyroids are the only endocrine glands not known to be influenced directly or indirectly by neural factors. A neural mechanism seems to be implicated in the release of gonadotrophic hormone, even in the so-called " spontaneously " ovulating animals such as the rat (Everett & Sawyer, 1950), cow (Asdell, 1953) and sheep (Moore & Nalbandov, 1953). The need for more information on the effects of management factors on such mechanisms is illustrated by recent work connecting frequency of milking with the herd incidence of cystic ovaries (Casida & Chapman, 1951), and transportation stress in bulls with depressed spermatogenesis and enhanced excretion of adrenal cortical hormones (Meschaks, 1953).

In addition to neural activation of the anterior pituitary (by mating, milking, light and emotional stimuli) an important regulatory mechanism is the humoral " feedback," whereby the blood concentrations of adrenocortical, gonadal and thyroid hormones control the output of the respective trophic hormones from the pituitary. This situation has important therapeutic consequences. Thus the effects of submaximal doses thyroxine or cortisone will tend to be offset by a compensatory decrease in endogenous thyrotrophic and adrenocorticotrophic hormone secretion, and prolonged administration results in atrophy of the thyroid and adrenal cortex. This homeostatic principle probably accounts for some of the disappointing results with thyroprotein feeding of cattle to stimulate milk production (Thomas & Moore, 1953). In the case of the parathyroids and pancreatic islets humoral control appears to be direct, via the blood concentrations of calcium and glucose respectively. Nevertheless, by altering these concentrations exogenous supplies of the hormones induce a compensatory decrease in endogenous output.

Synthesis of hormonal secretions may be influenced

in at least two ways by dietary factors. There is evidence that nutritional deficiency, especially in protein, impairs production of anterior pituitary hormones (Samuels, 1947), while on the other hand certain toxic substances, notably the goitrogens (Purves, 1943), may block specific stages in hormone synthesis. The application of new chemical techniques (*e.g.*, partition chromatography and radioisotopes) has added much information on the secretory activities of endocrine glands. It is becoming very evident that the presence in the gland of extractable principles with hormonal activity need not necessarily mean that these substances are secreted as such into the blood. It now seems very doubtful if the adrenal cortex secretes appreciable amounts of desoxycorticosterone and even cortisone seems to be quantitatively less important than hydrocortisone, though work on the larger animals has only just begun (Bush & Ferguson, 1953). Similarly it is unlikely that the secretion of the posterior pituitary gland is equivalent to commercial " Pituitrin." It is seldom wise, therefore, to assume that any hormonal preparation used in treatment adequately replaces the natural secretion.

Until recently we have been in almost total ignorance of the blood concentrations of hormones, and had to deduce these indirectly from the status of the glands themselves or of their target organs. More sensitive methods of biological and chemical assay show promise of providing invaluable diagnostic weapons. Chromotographic estimation of blood steroid hormones is undergoing rapid development and already progesterone is estimated in this way in ruminants (Edgar, 1953).

It is becoming axiomatic that hormones have widespread metabolic effects. Thus gonadal hormones exert their most prominent effects on the reproductive organs, but also affect mineral and water metabolism as well as growth. The existence of these side actions presents one of the chief hazards in hormone administration for, as emphasised above, unless maximal doses are given the desired effect may be prevented by reduced endogenous output of the hormone ; but with supramaximal doses the undesirable side effects become evident. This situation is well illustrated by results with thyroprotein feeding (Thomas & Moore, 1953) and stilboestrol implantation in dairy cattle (Folley & Malpress, 1944).

The target tissue may not always respond to injected hormone. Some hormone preparations are antigenic and continued treatment becomes less effective due to combination with antibody, which may be specific to the hormone molecule, rather than to contaminating protein (Ferguson & Boyden, 1953). Well known is the need for sensitisation of the uterus by oestrogens before oxytocin exerts its characteristic effect. There is no evidence that these conditions apply to the milk-ejection function of oxytocin (Cross & Harris, 1952), but hypocalcaemia (Peeters, Massart & Coussens, 1947) and sympathetico-adrenal activity (Cross, 1953) have been shown to block the mammary response to oxytocin. There are many other possibilities for unresponsiveness to hormonal stimulation. Hormones are widely assumed to act by influencing cellular enzyme systems (Meyer & McShan, 1950). A vast amount of *in vitro* work has been done, but it cannot be said that we are well informed about the operation of such mechanisms in the intact animal. Alternative theories have been advanced that changes in cell membranes may be responsible for hormone action (Stadie, 1951). While so large a sphere of ignorance exists in this aspect of endocrine function we must expect limited success with hormone treatments.

It has been suggested from time to time that clinical symptoms may develop as a result of inefficient elimination of hormones from the bloodstream. Thus liver cirrhosis has been associated with symptoms of hyperoestrogenism (Paschkis & Rakoff, 1950), and also with oedema thought to arise from excess antidiuretic hormone (Pickford, 1952). While the evidence supporting these views is unconvincing, the possibility remains that retarded elimination of circulating hormones may occur and produce hyperfunctional endocrine conditions.

Conclusion

If rational therapy is to replace empirical use of hormonal agents in veterinary medicine we need more fundamental knowledge of the endocrine system in the larger domesticated animals. Objective tests are needed both for accurate diagnosis and for assessing the therapeutic response. So far as the herd, rather than the individual animal, is concerned, more information is required concerning the effects of environmental, dietary, management and psychological factors on endocrine function.

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From Micro-Organisms

BY

J. R. HUDSON

AS your Secretary has assured me that it is intended that for the purpose of this meeting, the prophylactic use of vaccines shall be included in therapeutics, it is my intention to speak mostly on this aspect of the subject.

Curative Use of Sera and Vaccines

I can say little on this topic from personal experience. I think that, in general, the use of hyperimmune sera is of small value once symptoms become apparent. There are those who believe that antidistemper serum is of value after the appearance of symptoms ; but I am not aware of critical experiments proving the point. There is also a belief that the injection of distemper virus is beneficial. One finds it difficult to explain why this should be so unless indeed the effect is produced by non-specific protein shock. The virus usually employed is exhibited in a heterologous tissue and similar results might follow the use of a dose of egg-white, separated milk or horse serum.

In the treatment of disease in animals showing symptoms, the tendency to-day is undoubtedly away from the use of sera and vaccines and towards the use of sulpha-drugs and antibiotics, *e.g.*, in anthrax, swine erysipelas and mastitis. Much time and thought expended some years ago in attempts to treat ulcerative cellulitis in horses destroyed my faith in vaccines as curative agents for bacterial diseases. Curative autogenous vaccines never found as much favour with us as they did with the medical profession (possibly because our patients are less susceptible to psychological effects) and antibiotics have caused their virtual disappearance.

Prophylactic Use of Sera and Vaccines

To simplify discussion of trends in this subject, I shall consider two aspects separately (1) the details of preparation of vaccines and sera and (2) the more general administrative use of these products.

In so far as the basic principles of immunisation are concerned we can render an animal passively immune by the parenteral administration of serum or by giving colostrum by the mouth. Active immunity can be induced by injecting a live attenuated strain of the infective agent, a dead or inactivated vaccine prepared from the fully-virulent agent or, lastly, other products derived from the causal agent. Most of these ideas go back to Jenner & Pasteur, some perhaps even earlier, and we can claim few advances in fundamentals since Ramon introduced the anatoxins, etc., in the 1920s. Changes in detail are, of course, plentiful.

With any particular disease, one method of protection may hold the field for a time to be replaced wholly, or in part, by another method. The change may be from a live virus method to an inactivated vaccine method or *vice versa* and taking our diseases as a whole, it is not easy to say which way the trend is and quite impossible to forecast how it will continue.

The changes that have occurred in rinderpest prophylaxis since I first became embroiled in it in Kenya may be of interest in illustrating how changes can occur in a relatively short period. In 1926–29 the double inoculation or serum-simultaneous method was the only one practised as a routine. The method was rather cumbersome, expensive, and necessitated some skill on the part of the operator. In 1929 Daubney's inactivated vaccine was introduced into the field where it rapidly gained in favour since it was quite "safe" and easy to use. On the other hand, it induced a more limited immunity than the double inoculation method and it was, therefore, only suitable for those animals that were worth annual reinoculation. So long as it was produced as a by-product of serum manufacture, it was relatively cheap ; but as the demand for serum fell, production became less economical.

In an attempt to prolong vaccine immunity, the vaccine-virus method was introduced. This method was intrinsically the same as the Laidlaw-Dunkin method of distemper immunisation ; but a much larger dose of virus was given. On the whole it worked well. It was cheaper than serum plus virus and was safer. On the other hand, it was not possible to ensure in all cases the conversion of the initial temporary vaccine immunity into a prolonged immunity by the virus given 13 to 15 days later. A small percentage of animals, usually under five, did not derive lasting protection. The method, nevertheless, had its uses and a considerable number of ranch cattle were protected by this method throughout the middle and late 'thirties.

The obvious advantage of an attenuated live virus or bacterial vaccine is its cheapness. A small dose of virus or organisms is inoculated, it multiplies in the host and thereby produces a relatively long immunity. Search for an attenuated rinderpest virus at Kabete led in the early war years to the introduction of Kabete attenuated goat virus (K.A.G.). The obvious disadvantage of an attenuated, live virus is the risk of causing mortality in animals that are unduly susceptible by reason of breed or intercurrent disease. K.A.G. virus is not suitable for introduced European breeds nor for indigenous cattle of Sanga type (the former are in any event very conveniently protected by inactivated vaccine) ; but it is very suited to the mass immunisation of African and Indian zebu stock except perhaps where the incidence of such intercurrent diseases as trypanosomiasis and fascioliasis is heavy.

During the war the Grosse Island team developed a vaccine by the adaptation of a strain of rinderpest to the fowl embryo and its attenuation in the yolk sac. The work suggested that strains of any degree of attenuation could be obtained and that a vaccine for any particular type of cattle could be produced. Unfortunately the adaptation to, and behaviour in, the fowl embryo of the virus of rinderpest is far from being fully understood, even now, and, although a useful vaccine was undoubtedly produced by the Canadian and American workers concerned and tested in Kenya in 1945, attempts to repeat and follow up this work have led only to a mass of unpublished results.

About 1948 the Nakamura III strain of rabbit-adapted rinderpest virus was introduced into Kenya and found to be considerably less virulent for European type stock than K.A.G. This attenuated virus may, therefore, be used for these animals instead of the inactivated vaccine. It has, however, few advantages since it produces an immunity that lasts little longer and, although it may be cheaper, it is considerably more delicate to handle and vaccinations can hardly be left to the farmer.

What trend can we deduce from this story ? Who knows but that the next development may not be an improved inactivated vaccine containing an adjuvant. In some countries a formalised vaccine containing aluminium hydroxide has been in use for a number of years. Experiments in Thailand in 1950 showed that

such a vaccine is far superior to killed vaccines without the adjuvant, both in keeping properties and in immunising power.

Possible Future Trends

On the whole, however, there may be a trend towards the use of attenuated living viruses as immunising agents in virus diseases. Some examples are the replacement, by avianised viruses, of Semple-type inactivated rabies vaccines and of Laidlaw-Dunkin distemper vaccine ; the increasing use in the U.S.A. of lapinised swine fever virus in place of serum simultaneous inoculations ; the use of K.A.G. and lapinised viruses in rinderpest as already mentioned and the use of attenuated, egg-adapted strains in the Onderstepoort bluetongue vaccine.

There is a danger of going too far in decreasing the virulence of virus strains used as immunising agents. Cattle of resistant breeds will not always react to lapinised virus proved viable by inoculation to more susceptible animals. Yet these animals may die later if exposed to a more virulent strain of greater attacking power. Avianised rinderpest virus could be attenuated to the extent that it failed to protect a percentage of relatively susceptible cattle. Young animals may be somewhat resistant to a disease whilst under the protection of maternal antibody and inoculation of an attenuated virus may then fail to produce a response. For instance, it is unwise to rely on the immunity of yearlings vaccinated against horse sickness as young foals. We may, therefore, find this trend to milder strains being reversed.

In so far as the living bacterial vaccines are concerned, we have also a tendency towards the use of less virulent strains. S.19 has replaced almost entirely the virulent *Brucella* vaccine of 30 years ago. Sterne's highly antigenic, avirulent roughs have largely replaced the Pasteur attenuated strains long used in anthrax vaccines. In anthrax we see clearly virulence and antigenicity as two quite distinct features of an organism. The antigenicity of these roughs varies enormously on first isolation and can be lost by careless cultivation. Perhaps we have a clue here to the future development of many other living vaccines.

With inactivated bacterial vaccines, Ramon's work on anatoxins has largely led to the replacement of suspensions of organisms killed by heat and subsequently carbolised, by liquid cultures killed by formol. With anaerobes this type of vaccine has the advantage that it contains anatoxins as well as killed bacterial bodies. There is a tendency to improve the immunising value of these vaccines by the addition of adjuvants, for example, in some swine erysipelas and botulism vaccines.

Mass Inoculation

Turning from the details of vaccine type to a wider view of the use of biological products one can see two quite definite trends. Firstly, there is a trend towards the mass use of vaccines in order to eliminate diseases. The extensive inoculation of cattle in Kenya against rinderpest has meant the disease is no longer an important cause of economic loss. Wholesale diphtheria immunisation in Great Britain has made cases of diphtheria a rarity. Mass rabies vaccination in Malaya has apparently eradicated the disease. We see a marked increase in the use of crystal violet vaccine under the new scheme in this country and a recent letter in THE RECORD suggested a general campaign against canine distemper. In the U.S.A. mass use by inhalation of Newcastle disease vaccine may also be mentioned.

The other trend is a very welcome one, the move towards closer standardisation of biological products. The Therapeutic Substances Order, now in force, ensures that products sold are properly tested so that they can have no harmful effects. A strong effort was made by the Biological Products Sub-committee of the British Veterinary Codex to produce minimum requirements of potency for all the vaccines and sera included in that work. As a result, for most products, some potency test is given. Standard preparations of *Clostridium welchii* antitoxins are now being produced and will be held at Weybridge, so, for certain products, strict comparisons will be possible. This type of work is bound to extend and the future may hold for us products not only safe but of fixed immunising value.

Chemotherapeutic

BY

D. D. OGILVIE

THE centenary of the birth of Paul Ehrlich which is now being celebrated, emphasises the relative shortness of time which has elapsed since the modern science of chemotherapy came into being. But now this science is in full flood. Of course, the art of chemotherapy is as old as man himself ; it is only the science which is the child of to-day. After all, the Chinese were well versed in the properties of ephedrine 5,000 years ago ; the Aztecs knew about oil of chenopodium ; the Greeks about male fern ; the Arabs about santonin ; and ipecacuanha was recognised by the prehistoric natives of Brazil. Across the Andes in what was then another world, primitive savages in Peru knew how to use cinchona bark as a therapeutic agent long years before the Jesuits brought it back to Spain. Even antibiotic therapy has its roots in antiquity, for did not the substance *usnea*, a mould scraped from the skulls of criminals who had hung in chains, gain credit over the centuries for many remarkable cures ? Indeed, it was an official drug of the pharmacopoea until the 19th century.

But all these developments came slowly over the years and resulted from vast labours in a trial-and-error system whose margins of error were such as to allow a multitude of worthless things to gain repute, and yet often to miss altogether merits and usefulness in others.

In this disordered field, Ehrlich stressed exactness, critical examination, and pharmacological effect as of prime importance. The theories he propounded and the attitude of mind he adopted changed the art of chemotherapy into a science. The evolution of organic chemistry, the widening horizons of biological knowledge, the association of great numbers of scientists of many different disciplines, translated the infant science into the vast enterprises of to-day.

Obviously, in the short span of this paper, it is impossible to explore even superficially the genesis of any of the great discoveries which have been made since Ehrlich set out on his adventures in the early years of this century. That their number continues to grow is very obvious ; and from quiet and slow beginnings the pace of their arrival now quickens. But as the discoveries are made the difficulties of the work increase. The easier problems are resolved first, the tougher ones remain. Fortunately, however, there are compensations. Success is seldom gained in one field without throwing new light on another, and the very diversity of the effort now being employed allows alternative routes to be pursued to even the most unpromising of our problems.

Bovine acetonaemia is perhaps a case in point. This puzzling disorder is now being approached from many viewpoints—from the management side by the zootechnologist, from the nutritional aspect by the physiologist (or should it be *vice versa* ?), and from the therapeutic viewpoint by the specialists in hormones and rumen chemistry. The work of Shaw (1951) and his associates in America hardly needs reiteration. From it, of course, has come the use of cortisone and adrenocorticotropic hormone in the treatment of clinical cases of this disorder. In the U.S.A. at least, these substances have proved to be a considerable improvement on present treatments. But in the U.S.A. only about 75 per cent. of cases respond completely to them, and often concurrent sugar therapy is necessary to prevent relapses. These disadvantages, together with the high cost of cortisone and ACTH, have stimulated efforts to obtain inexpensive substances which can be employed effectively by mouth. In this respect, it has been known for some time that blood glucose levels of ruminants are low, in fact about one-half of those of non-ruminants. Rumen bacteria rapidly utilise ingested glucose or glucose formed by rumen fermentative processes and absorb fatty acids such as acetic, propionic and butyric for use as sources of energy. However, only propionic acid can be reconverted to glucose and sodium propionate has been employed, therefore, in the treatment of clinical acetonaemia. Good results have been reported with it from the United States but unfortunately the response is often rather slow and the doses of it which can be used are limited. Because of this, investigations are now turning to other glucogenic substances, and glycerol has been under examination. It is a natural metabolite, synthesised when fat is formed and oxidised when fat is catabolised, is known to be glucogenic, and is well tolerated by cattle. Tests have shown that it is a most effective means of supplying large quantities of glucose but unfortunately it is costly. In order to make the treatment less expensive, propylene glycol is now being tried. It has marked glucogenic properties and recently has been found to be a normal metabolite, so it is of reasonably low toxicity. It is readily consumed by most cattle when mixed with the feed, but in the treatment of clinical cases is probably best given in the drinking water or as a drench. Sufficient experience has not yet been gained to say whether it is more, or less, effective than adrenocorticotropic hormone or cortisone ; but with it the recovery rate appears to be at least as rapid. Doses of 200 to 450 grammes twice daily have been used and, so far, clinical results have been promising.

This work against acetonaemia, directly valuable as it is to the clinician is, however, relatively simple compared with the complexities of chemotherapy when applied to neoplasms and virus diseases. Here we become at once involved in the tangled skein of cellular relationships and cell nuclear metabolism. Specific chemotherapy against invading parasites and bacteria, with its underlying principle of differential toxicity, avails us little at first glance when we are dealing with aberrant natural cell processes or with organisms actually enveloped with the nuclear protoplasm. But already we know that chemical substances can exert profound effects on cell nuclei and it is on the further and more exact study of these effects that hopes of greater chemotherapeutic success against neoplasms now rest.

In contrast with the field of neoplasms, however, there was until recently no sure indication that chemotherapeutic agents could be evolved which would influence in any way the course of true virus infection. It had been demonstrated, of course, that antibiotics such as aureomycin and even some of the sulphonamides are active against a few of the larger viruses such as lymphogranuloma, but the more important true viruses which invade and become very closely associated with the cell nuclei had resisted all efforts to be affected selectively by chemical means.

The work of Weston Hurst (1952) and his colleagues has, however, recently demonstrated that they are susceptible. Using the viruses of equine encephalomyelitis and louping-ill, he has shown that mepacrine, various bis-azo dyes, and other substances containing in the molecule numerous sulphonic acid groups, markedly affect the course of disease in experimental animals. Of these substances, mepacrine is by far the most active. With it he has been able to protect the majority of mice from encephalitis after injection of virus, whereas unprotected mice invariably have succumbed. Mepacrine has, however, no curative action once the disease is established. It is taken up by the cells of the reticulo-endothelial system which is probably the chief site of multiplication of these viruses outside the nervous system. Thus it inhibits growth of virus and greatly reduces the blood titre so that there is much less available to invade the nervous system.

The specific chemical considerations which have been and are being given to problems such as these were for a time somewhat disrupted by the advent of the antibiotics. Research into these complex, naturally produced substances whose chemistry was at first obscure, shifted emphasis again to simple trial and error methods which over a short number of years produced the 10 or more antibiotics now in everyday clinical use. But chemical investigations did not altogether languish. First the structure of chloramphenicol (" Chloromycetin ") was established, and then, not without difficulty, that of penicillin. Now a wide and hopeful development has occurred with the establishment of the structure of " Aureomycin " and " Terramycin." Both these antibiotics have a common root in tetracycline. " Aureomycin " has proved to be chlortetracycline and " Terramycin," oxytetracycline. This

synthesis might well lead to the long-awaited "tailored" antibiotics as well as providing a new antibiotic in tetracycline itself which has a wide spectrum of activity, is of low toxicity, and appears to be effective against a number of antibiotic-resistant organisms.

The past year in chemotherapy, then, has been a fitting prelude to Ehrlich's centenary. Among other notable achievements it has witnessed the synthesis of the posterior pituitary hormone, oxytocin; the revelation of the structure of vassopressin; the synthesis of several potent halogen analogues of cortisone; the discovery of a new corticosteroid substance, compound S; the introduction of long-acting diamine penicillin; the development of new hypotensive alkaloids; and the clinical acceptance of newly discovered anticonvulsant and analgesic drugs. We can look forward with confidence to the hope that the centenary year itself will be no less distinguished.

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Conclusions

BY

H. BURROW

THERE is obviously a great need for more veterinary pharmacologists. It is quite wrong to assume that veterinary pharmacology can be studied only on the basis of human pharmacology; among the various domesticated animals a wide variation must exist in the pharmacological action of drugs.

From what has been said of the profound alteration in the action of drugs, particularly of the synthetic drugs, arising from slight changes in their molecular structure, it is clear that, in using them, one must work along very precise lines. Diagnosis must, so far as is possible, be carried out with comparable precision.

The greatest difficulty encountered in the use of endocrine products is that of determining exactly to what extent the animal body is deficient in any one product. Furthermore, the interaction of hormones on the several body systems is so complicated that hormone therapy, while relieving one condition, may well set up other and perhaps more important dysfunctions.

We need more knowledge of the effects of environment and of psychological factors on endocrine function. All too frequently hormones are administered when the target tissues are not suitably conditioned to receive them and to respond to their action. It is useless, or even dangerous, to attempt to stimulate into activity tissues which have inadequate dynamic reserves.

As is often the case when veterinary and other scientists meet in conference, ketosis in cattle has been much discussed. One observation of great importance is that ketosis is not a single disease-entity but a symptom of a number of disturbances in general metabolism.

The promised advent of "tailored antibiotics" must call for something akin to "tailored diagnosis." Clinicians must make even greater efforts to keep pace with therapeutics in this particular field.

It has been emphasised that in studying the mineral and vitamin requirements of animals the whole field should be kept prominently in mind. The tendency to concentrate on one vitamin/mineral imbalance is likely to lead to even more disastrous results than those brought about by single deficiencies.

Recent developments with insecticides have revolutionised control of external parasites of animals, and emphasis is now placed on residual lethal value rather than on immediate but short-acting effects on the adult parasite.

Turning to anthelmintics, a timely warning is given to clinicians to take careful note of *post-mortem* findings before committing themselves to any opinion involving toxicity of well-recognised and accepted anthelmintics. Despite general advances the development of an effective agent for use against lung-worm, especially in cattle, is still called for.

The value of anti-sera as therapeutic agents has been questioned, but it is obvious that the doubts raised do not refer to anti-toxins. The value of autogenous vaccines has always been open to some doubt, and it is refreshing to see a definite challenge such as that being voiced on this occasion.

From what had been said the greatest difficulty facing immunologists was that of producing a vaccine sufficiently potent to elicit a response and, at the same time, sufficiently reduced in virulence to minimise the dangers of setting up new centres of infection. In this connection the most important statement was that "virulence and antigenicity were two quite distinct features of an organism." Related to this production problem is the need for the standardisation of biological products. So long as it does not lead to monopoly being acquired by any one laboratory, standardisation can do nothing but good.

Thinking over all that had been said that day, one was led to the conclusion that diagnosis and therapy must develop in very close harmony. Each must keep pace with the progress made by the other. At the same time one must remember that the vast majority of animals were healthy and remained so throughout their lives. Much of their health could be attributed to stamina in the animals themselves and to good stockmanship on the part of their owners.

Therapeutic agents were of value only in dealing with accidental departures from the normal in the individual animal, or in the protection of animals from infections or infestations so concentrated that normal stamina could not evade them.

CONGRESS GOLF COMPETITIONS

Entries for the ladies' competition for the "Dunkin" Trophy, and the men's competition for the "Simpson" Trophy should be sent to Mr. A. Smith, M.R.C.V.S., Rosslyn, Torquay Road, Paignton, South Devon, who is in charge of the arrangements. Time has been provided for these competitions to be played on Thursday afternoon, September 23rd, over the Churston Golf Club's course.

The James Thomas Edwards Memorial Fund Appeal

To all Veterinarians wherever you may be, the South Wales Division of the British Veterinary Association makes this appeal to support a fund for the creation of a Research Scholarship in memory of the late Dr. James Thomas Edwards.

Contributions should be sent to D. B. DAVIES, Esq., M.R.C.V.S., Ministry of Agriculture, Lyric Buildings, Carmarthen.

AS most members of the Profession will know, Dr. Edwards, after a distinguished early career, became Director and first Bacteriologist at Mukteswar Central Province, India, in October, 1921, and retained this post until 1929. It was here his most memorable work was accomplished: that on Rinderpest.

Although there was only a very small senior staff at Mukteswar Edwards made remarkable progress in a relatively short time. He put his whole heart into the major animal disease problems and made them his own. Perhaps his greatest work was done in immunology. He was convinced that the use of a living virus modified by passage in a foreign host was superior to the use of a killed virus. At first he used rabbits, and succeeded for the first time in passaging the virus in these animals ; but his stock of rabbits had to be destroyed owing to an epidemic of intercurrent disease and he turned to the goat.

The virus strain thus bred became the most widely used agent for immunisation of cattle against Rinderpest in India and Africa, and later in other parts of Asia.

It so happened that a Japanese scientist visited Edwards at Mukteswar when his rabbits passage experiments were in progress. Although the discovery of the potentialities of the rabbit were not taken up by British workers, Nakamura in Japan continued this work and brought it to fruition in the development of what is now known as the caprinised strain of Rinderpest virus, the use of which is rapidly increasing and tending to replace other vaccines.

Of further interest is the lead given by Edwards's work on Rinderpest to recent studies of Swine Fever Virus. Both Baker and Koprowski, and his colleagues James and Cox, as recently as 1946, succeeded in adapting the Swine Fever Virus to rabbits, and strains of this rabbit adapted virus are now being developed as a greatly improved method of immunisation against Swine Fever. Many people think that a new era in the control of the disease is about to open.

The economic value to tropical and sub-tropical countries of the contributions Edwards made to disease control is immense and is generally acknowledged. For the first time international conferences are beginning to speak with optimism of the possibilities of eradicating Rinderpest from Africa, and even from the world.

Edwards received many honours : he was Correspondent Etranger de l'Academie de Médicine de France. He was Editor of the *Journal of Comparative Pathology and Therapeutics*. In 1940 he was awarded the Weldon Dalrymple Cup and Medal. He served as an Examiner to the Royal College of Veterinary Surgeons and as a Councillor from 1941 until his death. In 1938 he was awarded the Victory Medal by the Central Society. He was a Fellow of the Royal Society of Medicine and Hygiene, a member of the Pathological Society of Great Britain and Ireland, and of the Biochemical Society.

Truly this is the record of a great man. A man of sterling character, and one whose ideals had been with him from youth. His labours were of such world-wide diversity that though he dearly loved his native Wales he was prevented from returning to it. He had become not simply a Welsh, but an international scientist.

It seems appropriate and proper to invite Divisions of the British Veterinary Association to support this memorial to so eminent a veterinarian and in doing so to pay tribute to their distinguished colleague. As one who knew him intimately truly said, " No man I have ever known has done so much of value and received so little in return."

The proposed Memorial Scholarship will provide funds to assist suitable candidates to take up post-graduate work in any part of the world on any subject relating to veterinary science.

This Appeal is extended not only to members of the Profession who wish to share an opportunity for doing honour to Dr. Edwards. It is open also to those in other branches of science who would like to help perpetuate the name of a great colleague and recognise in some measure the work he did. " Now they rest from their labours but their work followeth after them," aptly sums up the life and achievements of James Thomas Edwards.

Current Literature

ABSTRACTS

"Q" Fever in Britain: Sheep as a Source of Infection for Man. MARMION, B. P., *et al.* (1954). *Lancet.* 1288–91.

Earlier epidemiological work had indicated a higher incidence of clinical and sub-clinical Q fever to exist among the human population in Kent than in certain of the eastern counties. This, the authors considered, might be explained by the difference in the available numbers and species of domestic animal hosts.

They showed that although the density of cattle is approximately the same in both districts, the incidence of *R. burneti* infection, as judged by tests on herd milk samples, was much higher in Kentish cattle (8·2 per cent. cf. 0·24 per cent.).

The very much larger number of sheep kept in Kent led the authors to consider whether this might be another source of human infection. With this in view an investigation into the incidence of clinical and sub-clinical Q fever in humans and a serological examination of certain flocks for *R. burneti* antibodies was undertaken on the Romney Marsh. This was specially chosen because of its sparse population allied to a heavy concentration of sheep and few cattle.

The investigation proved that clinical and sub-clinical Q fever was common among the human population of this area. On serological evidence *R. burneti* infection in sheep was also common. It was shown that 1·6 per cent of the sera of sheep killed in Kentish abattoirs contained antibodies at a titre of 1/10 or over. The comparable figures found in five flocks on the Romney Marsh associated directly or indirectly with cases of human infection were 4·3, 2·3, 33·7, 1·6 and 7·7 per cent. respectively. The authors also show that the seasonal occurrence of clinical Q fever coincided closely with the period of maximum handling of sheep (lambing, docking, shearing, etc.). These results, taken in conjunction with those of other investigations, proving that sheep can become infected with *R. burneti* and that a concentration of such infection occurs in the foetal membranes and fluids at parturition, enable the authors to regard sheep as a most likely source of human infection.

W. T. R.

Some Observations on the Spring Rise in Worm Egg Counts of Half-bred Sheep in S.E. Scotland. PARNELL, I. W., *et al.* (1954). *Brit. vet. J.* **110.** 185–193.

Observations on half-bred ewes in S.E. Scotland showed that the date of parturition has a marked influence on the date of the spring rise in worm egg output.

It is suggested that on well-managed farms no great advantage follows treatment before lambing though treatment of flocks doing badly or odd unthrifty sheep may be advisable. The worm egg counts of the lambs showed a very rapid build-up in May.

It is considered important that the worm burden of the ewes should be reduced by treatment before they contaminate the pastures which they will graze on leaving the lambing field.

Treatment may be done by individual closing followed by mixing small quantities of phenothiazine in their food to inhibit egg laying by the worms and the development of infective larvae.

J. S. S.

The Influence of the Introduction of Rams on the Incidence of Oestrus in Merino Ewes. RICHES, J. H., & WATSON, R. H. (1954). *Austr. J. Agri. Sci.* **5.** 141–147.

Two series of observations were made. In one, a group of Merino ewes was run continuously with vasectomised rams: in the other, ewes which had been kept separate from any rams were put in with similarly treated rams for periods of one month.

Oestrus was confirmed by daily examination of the ewes for the presence of raddle marks on the buttocks. The experimental observations indicated that there was an annual rhythm of sexual activity in the ewes in both groups and that, since the incidence of oestrus did not decline in the spring in the ewes which had been separated from the rams for some time after mixing, the presence of the rams had a stimulating influence.

Whilst many ewes failed to mate in the spring and early summer, sexual activity was never completely suppressed in any month. It must therefore be assumed that some ewes are more susceptible than others to seasonal changes. The evidence presented supports the view that even a limited association with the rams influences the subsequent behaviour of the ewes.

N. S. B.

Partly Purified Dried Epsilon Toxin and Toxoid as Reagents for the Standardisation of *Clostridium perfringens* Type D Bacterin. SCHUCHARDT, L. F., MONOZ, J., & VERWEY, W. F. (1954). *Amer. J. Vet. Res.* **15.** 316–318.

Clostridium welchii epsilon toxin, partly purified and concentrated by ammonium sulphate precipitation and freeze-dried, maintained full toxicity for mice for 28 months. Toxoid, similarly preserved, remained fully potent for 11 months.

The authors suggest that such dried preparations might be preserved centrally as references for the routine standardisation of *Cl. welchii* type D bacterins issued as prophylactics against pulpy kidney disease.

J. E. S.

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"The Practice of Veterinary Medicine." (New Sixth Revised 1954 Edition.) D. H. Udall, Professor of Veterinary Medicine and Superintendent of the Ambulatory Clinic, Emeritus in the New York State Veterinary College, Cornell University. New York: Udall Publishing Company.

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GENERAL ARTICLES

Gamma Globulin Prophylaxis of Canine Virus Distemper

BY

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THERE is experimental evidence to prove that a potent distemper antiserum has decidedly beneficial results if given in the early stages of the febrile form of the disease. But in the case of distemper, it would be unlikely that serum therapy could achieve any useful results, however early it might be given, as the virus in its intracellular position is protected, except for a brief interval. It would be reasonable to conclude, therefore, that serum therapy for distemper holds out little promise of being generally useful (Larin & Hodgman, 1954).

The prophylactic use of antiserum is, however, an entirely different matter. There is an abundance of experimental evidence to show the value of antiserum in providing rapid and effective protection, and it has been applied with manifest success in the prevention, or attenuation, of distemper virus in exposed susceptible dogs. Nevertheless, effective serum prophylaxis of distemper, as in other virus diseases, has its drawbacks. Antiserum is not the antibody in the pure state, but a mixture of the antibody with inactive proteins, carbohydrates, etc. Furthermore, different batches of antiserum may vary in their antibody content, and hence in their potency ; and in some batches the antibody concentration can be insufficiently high to make the standard dose (usually 10 c.c.) effective.

The literature on the chemistry of antibodies has recently been reviewed by Smith (1952), and their physical chemistry by Williams (1950). These works show that antibodies in human serum, and in that of some animal species, are associated with gamma globulin fraction of serum proteins, making possible the purification and concentration of antibodies in the form of gamma globulin, which has found wide use in the prevention of virus diseases in man. In veterinary medicine immune gamma globulin has not yet been used. The first attempt to purify and concentrate the antibody to canine distemper virus was made by Laidlaw & Dunkin (1931), who found that distemper antibody was associated with globulins of the antiserum. There were no further attempts to continue this study.

Pursuing investigations into the virus propagation in cultures of animal tissues one of the authors (Larin) conducted a course of studies on the immuno-chemistry of distemper antibody, attempting to purify it from the bulk of inactive material in antiserum. The result showed that distemper antibody is associated with the gamma globulin fraction of serum proteins. Similar studies conducted on canine hepatitis virus have shown that its antibody is also associated with gamma globulin.

Results of Field Trials

Obviously this raised a practical problem, and almost immediately we proceeded to test distemper antibody in the form of gamma globulin for the prophylaxis of canine virus distemper in dogs. It is the purpose of this paper to report on the field trials over the last two years.

Four hundred dogs of various breeds and ages, at different kennels, were inoculated simultaneously with virulent distemper virus and immune gamma globulin for the purpose of active immunisation against the disease. Out of 400 inoculated dogs, 262 (65·5 per cent.) developed febrile reactions, of 103° F. or over, and some showed clinical signs of the disease ; three out of 262 (1·1 per cent.) died from complicated distemper, the others completely recovered. The percentage of deaths to the total number of dogs simultaneously inoculated was 0·75 per cent.

Apart from these well-controlled experiments we have inoculated over 300 dogs, for passive protection against distemper, with good results. Immune gamma globulin can be made bivalent, *e.g.*, active against both canine distemper and hepatitis viruses, or even polyvalent, *e.g.*, active against the above viruses and bacteria often complicating virus distemper. This fact will certainly widen the scope for the practical use of this preparation.

It is an established fact that neo-natal mortalities are high in kennels with endemic canine virus hepatitis. The "fading" of puppies may be due to various factors, such as bad kennel management, etc., but it may also be solely due to hepatitis virus infection of puppies by carriers.

Following consultations with veterinary surgeons on cases of puppy mortalities due to canine hepatitis virus infection, we have supplied immune gamma globulin for the inoculation of pregnant bitches, one week before whelping, followed by inoculation of puppies within 24 hours of birth. The reports so far submitted to us have been most encouraging as it appears that such treatment definitely assists in clearing infection and controls the puppy mortality.

The use of immune gamma globulin in the prophylaxis of canine virus hepatitis will be the subject of a

separate paper ; its mention here must be regarded only as a preliminary communication.

Summary

To summarise, trials in the field have shown that the specific activity of the purified distemper antibody in the state of vacuum-desiccated gamma globulin is very high. Moreover, immune gamma globulin has distinct advantages over distemper antiserum. These are as follows :—

1. The use of immune gamma globulin minimises the danger of transmitting canine hepatitis virus which might be present in the antiserum. Gamma globulin contains no preservative and, therefore, it can be intravenously inoculated if, and when, required.

2. Vacuum-desiccated gamma globulin, sealed in ampoules under vacuum, can be stored in a dark place at room temperature much longer than antiserum. Experiments made on storage of gamma globulin at 37° C. have shown that this temperature does not affect the preparation.

3. Gamma globulin can be made bivalent, *e.g.*, active against both canine distemper and hepatitis viruses, or even polyvalent, *e.g.*, active against the above viruses and those bacteria often complicating distemper.

4. Gamma globulin is 10 times the concentration of the antibody, compared with antiserum. One dose of desiccated gamma globulin, which is equivalent to10 c.c. of antiserum, can be easily dissolved in as little as 1 c.c. of distilled water. This simplifies the use of the preparation if compared with antiserum, *e.g.*, in a case when it is desirable to inject a dog with gamma globulin equal to 2 or 5 c.c. of antiserum, the corresponding doses of concentrated gamma globulin will be only 0·2 and 0·5 c.c. When it is necessary to inoculate a dog with an amount of gamma globulin equivalent to 50 c.c. of antiserum the dose of gamma globulin will be 5 c.c. only.

5. From the point of view of production the cost is comparable with that of antiserum because the volume of antiserum used is reduced 10 times at the beginning of the process. This naturally simplifies all further stages of production.

Acknowledgments.—We wish to thank Mr. J. K. Bateman, B.SC., M.R.C.V.S., and all those other veterinary surgeons who have taken part in our field trials. Our thanks are also due to our colleagues, Dr. Davis and Mr. Skulski, for their assistance in preparing gamma globulin for field trials. We wish to record, too, our appreciation of the technical assistance of Mr. W. G. Orbell throughout the course of this experimental work.

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The Presence of *Mycobacterium johnei* in Apparently Normal Cattle

BY

J. DEANS RANKIN

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Introduction

IN recent years attention has been drawn to the presence in this country of a section of the cattle population which carries *Mycobacterium johnei* within the lymphatic system but shows no symptoms of Johne's disease. Taylor (1949) has shown that, in one sample of the cattle passing through an abattoir in Newbury, 15 per cent. of the animals were harbouring *M. johnei*. This short paper records the results of two further samples passing through two widely separated and much larger abattoirs.

Method

The mesenteric lymph node lying at the entrance of the ileum to the caecum was the one chosen for examination. The method of culture was that used by Taylor (1949).

Results

Sample 1 (*City of Birmingham Abattoir*)

Between August, 1952, and March, 1953, lymph nodes from 552 cattle were examined and on 33 occasions *M. johnei* was recovered. (Incidence 6 per cent.)

Sample 2 (*M.O.F. Abattoir, Reading*)

During the period January to April, 1954, lymph nodes from 358 cattle were examined and from 27 *M. johnei* was recovered. (Incidence 7·5 per cent.)

Prior to January, 1954, a large number of cattle from Ireland were being slaughtered at this abattoir and the opportunity was taken to examine some of these. Of the 256 examined only two were found to harbour the organism. (Incidence 0·8 per cent.)

Discussion

Although the figures quoted show an incidence of about one-half of that quoted by Taylor they do support his contention that there is an unexpectedly high incidence of infection with *M. johnei* in apparently normal cattle.

The very low incidence of these occult cases in the sample of Irish cattle is noteworthy. Between the months of August and January quite a high proportion (13·5 per cent. at Birmingham) of the cattle passing through the larger abattoirs are from the " Irish trade " and unless they are excluded from a survey of this type they would influence the results in favour of a lower incidence than is actually present in Britain. For example, if the Irish cattle are included in the Reading survey the incidence drops from 7·5 to 4·7 per cent.

No satisfactory explanation has been found for the difference between Taylor's results at Newbury and those quoted above. As the preparation and inoculation of the medium was carried out in the same way as in the 1949 survey, and usually by the same staff, it is felt that the discrepancy reflects some difference in the

News and Comment

In future, what has previously been known as Notes and News will be printed under this heading. It is hoped to publish a wider selection of current news items than has been the case in the past, and contributions will be most welcome from honorary secretaries of Divisions, from the universities and schools, research institutes, field stations, members of the Ministry's Field Staff, and from members of the profession in private practice. We should also be glad to hear from representatives of the student body. Items of every kind likely to be of interest to veterinarians are invited, and occasional paragraphs in a lighter vein will be very acceptable. An important part of THE RECORD'S function is to be a *news* paper and we look to readers to help to make it so.

THE WESTERN COUNTIES DIVISION

The Western Counties Division in whose territory this year's Congress is being held, and whose members have done so much preliminary work to promote its success, came into being on February 7th, 1884. Its founders had in mind four purposes: the elevation of the scientific and social standard of the profession; the establishment, promotion and maintenance of friendly understanding among members; the supervision of their professional interests, and the discussion of subjects relating to the art and science of veterinary surgery. These four purposes have remained the motivating force of the Division to this day.

The names of early members are repeated among their descendants, who are current members of the Division. Such names as Penhale, Parsons, Nelder, Harvey, Bovett, Ascott and others appear all down the years on the Division's roll. Many distinguished members of the profession have been Western men, and among them Glave Saunders and S. J. Motton will be familiar to a wide circle.

The Division's area comprises Cornwall, Devon and West Somerset.

TORRE ABBEY

Torre Abbey, where the majority of Congress meetings are to take place, goes back to 1196, when the first Abbot, Adam, with six monks, came from Welbeck to establish it. The monks continued until the dissolution under Henry VIII, when Torre was made over to John St. Leger, who sold it almost immediately to Sir Hugh Pollard. After various exchanges of ownership it came into the hands of the Cary family in 1662, by whom it was owned until its sale to the Corporation of Torquay in 1930.

After renovation it was used as a picture gallery until the outbreak of war, when it became a headquarters of the Royal Air Force.

The church and chapter house are rich in historic association; and both antiquaries and students of architecture will find much that is of absorbing interest.

THE TITHE BARN

The tithe barn of Torre Abbey, where the exhibition of surgical instruments, drugs, etc., is to be held is one of the finest of its kind in existence. Its exact date is not known, but is assumed to be about the end of the 12th century. The name "Spanish Barn," which it later acquired, arose from the imprisonment there of the crew of the flagship of the Andalusian squadron, captured by Drake in Torbay Bay at the time of the Armada. The cost of maintaining these captives—4d. per day—was met by Sir George Cary whose family later purchased Torre Abbey.

Since its acquisition by the Corporation the Barn has been carefully restored, and but for the addition of discreetly arranged electric lighting is much as it was in the first Elizabeth's day.

PERSONAL LIAISON OFFICERS TO THE MINISTER OF AGRICULTURE

The Minister of Agriculture has invited the personal liaison officers appointed by his predecessor to continue to act in the same capacity for him. All the liaison officers have agreed to do so. They are as follows:—

Major Fitzherbert Brockholes, C.B.E., M.C., J.P., Lancashire, Yorks (E.R.), Yorks (N.R.), Yorks (W.R.); Sir Cecil Armitage, C.B.E., D.L., Derbyshire, Nottinghamshire, Lincolnshire (Kesteven), Lincolnshire (Lindsey); Sir Edward Foster, C.B.E., J.P., Cheshire, Herefordshire, Shropshire, Staffordshire, Warwickshire, Worcestershire; Major Sir Richard Proby, BT., M.C., Hunts and Soke of Peterborough, Lincolnshire (Holland), Bedfordshire, Isle of Ely, Hertfordshire, Cambridgeshire; Colonel Sir Robert

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field. This could be a difference in either local or general incidence but a more probable reason is the difference between the type of cattle passing through these two larger abattoirs and the type passing through the much smaller abattoir at Newbury.

Summary

M. johnei was recovered in culture from lymph nodes of 6 and 7·5 per cent. of two groups of apparently normal homebred cattle.

The corresponding figure for cattle from Ireland slaughtered in this country was 0·8 per cent.

Acknowledgments.—I am indebted to Dr. W. S. Gordon, Director of the A.R.C. Field Station at Compton, for his continued interest in this work.

I should like to acknowledge the help given to me by the staffs of Reading and Birmingham abattoirs and to thank Mr. W. S. Davison, M.R.C.V.S., D.V.S.M., of the Birmingham abattoir in particular for his co-operation which enabled me to carry out part of this work so far from the laboratory.

Reference

TAYLOR, A. W. (1949). *Vet. Rec.* **61.** 539.

Gooch, BT., D.S.O., East Suffolk, West Suffolk, Essex, Norfolk, Mr. L. G. Troup, O.B.E., B.SC., Berkshire, Buckinghamshire, Oxfordshire, Middlesex, Hampshire, Isle of Wight; Mr. Dunstan Skilbeck, M.A., Kent, Surrey, East Sussex, West Sussex; Mr. Richard Trumper, C.B.E., Cornwall, Devon, Dorset; Earl Waldegrave, Somerset, Gloucestershire, Wiltshire; Mr. E. G. E. Griffith, Denbigh, Flint, Caernarvon, Anglesey, Montgomery; Captain N. G. Garnons-Williams, Radnor, Brecon, Monmouth, Glamorgan, Carmarthen; and Mr. R. Phillips, M.SC., A.R.I.C., Merioneth, Cardigan, Pembroke.

PUBLIC RELATIONS

In our correspondence columns this week reference is made to the importance of the profession's public relations service. It may be that the writer underestimates the problems raised by professional etiquette in approaching the newspapers, and by the substantial sums available to other bodies in "putting themselves over" to the mass of the community. None the less, the importance of presenting, through the Press, the wireless, and by other means the work, accomplishments and aims of veterinary surgeons is indisputable. We are indebted to members of the profession who draw our attention to matters calling for action, but in many cases, except for a private expression of indignation, things are allowed to pass unchallenged and uncorrected. The national newspapers are read each day at headquarters; but as more than 1,000 periodicals are published every week it is clearly impossible to see more than a fraction of them. With comparatively few exceptions the Press is willing to publish the profession's point of view; but its adequate expression, in local matters at least, can only arise if members of the Association will keep us "primed." Letters to headquarters are always acted upon unless some reason of major policy make action injudicious. May we suggest, therefore, that 10 minutes spent in writing a letter is of more service than the verbal expression, within a limited circle, of private irritation?

ATROPHIC RHINITIS AGAIN

A new outbreak of atrophic rhinitis, the first since June 3rd, has been confirmed by the Ministry of Agriculture. It has occurred at Willaston Hall Farm, Willaston, Cheshire, the animal affected being a six-months-old boar. Movement restrictions have been reimposed in the county, and the incontact pigs have been slaughtered.

"AGRICULTURE"

Agriculture, the monthly journal of the Ministry of Agriculture, is 60 years old this month. Since September, 1894, it has maintained an unbroken service to the farming community in England and Wales and readers overseas, steadily widening its scope and influence, recording and encouraging new methods and ideas throughout a period that has seen more vital changes than any other comparable time.

To commemorate the occasion, the Ministry has issued a special Diamond Jubilee number which, while surveying the tremendous progress of the past 60 years, also looks forward, through the eyes of several eminent agriculturists, to the future. One of the contributors is Sir Thomas Dalling, who writes on Progress in Animal Health and Practice.

An enlarged art section presents a portrait in miniature of the countryside of England and Wales. Copies may be obtained from H.M. Stationery Office or through any bookseller, price 1s. (post free).

MYXOMATOSIS

As a result of publication in a section of the Press that several domestic pets had been "suspected" of contracting myxomatosis, veterinary surgeons have received anxious inquiries from their clients. As most members of the Association probably know, it has so far proved impossible to transmit the disease to any other species, with the exception of hares in whom cases have been reported by French workers. Investigation is continuing at Weybridge and elsewhere.

COMING EVENTS

Sept. 19th—25th.—72nd Annual General Meeting and Congress of the British Veterinary Association at Torquay.

Sept. 19th.—Annual General Meeting of the Veterinary Section of UFAW, at Knuston Hall, Nr. Rushden, Northants, 2 p.m.

Sept. 30th.—Meeting of the Essex Veterinary Society at the Essex Institute of Agriculture, Writtle, 7.30 p.m.

Oct. 7th.—General Meeting of the Central Division, B.V.A., at the Royal Veterinary College, Camden Town, N.W.1.

Oct. 13th.—General Meeting of the Midland Counties Division, B.V.A., at the Birmingham Medical Institute, 2.30 p.m.

Nov. 16th & 17th.—B.V.A. Conference on the Feeding of Farm Livestock for Health and Production in the South Hall, Victoria Halls, Bloomsbury Square, London, London, W.C.1.

PERSONAL

Births

HARRIS.—On September 10th, 1954, at Kirkby Londale, Westmorland, to Pamela, wife of Tony Harris, M.R.C.V.S., a son.

HARRISON.—On August 31st, 1954, at Derby City Hospital, to Eunice (*née* McGregor), wife of A. F. Harrison, M.R.C.V.S., of 65, Mount Pleasant Drive, Belper—a son, Peter Frank, a brother for April Jennifer.

HOARE.—On August 17th, 1954, at Kitale, Kenya Colony, to Margaret Hoare, M.R.C.V.S. (*née* Massie) wife of Alec Hoare—a daughter, Heather Marianne.

HUSSEY.—On September 9th, 1954, at St. Margaret's Hospital, Epping, to Ruth (*née* Teverson, M.R.C.V.S.) wife of Bryan F. V. Hussey—a son, Adrian, brother for Christopher and Nigel.

JACKSON.—On September 6th, 1954, at Roakewood Hospital, Worcester, to Anthea, wife of W. T. Jackson, M.R.C.V.S., of Estate House, Cornmeadow Lane, Worcester—a daughter.

MCCULLOCH.—On August 3rd, 1954, at Chipinga, Southern Rhodesia, to Elizabeth, wife of J. C. M. McCulloch, M.R.C.V.S., a son—Alastair James Kerr.

ORR.—On May 30th, 1954, at the British Military Hospital, Benghazi, to Patricia Anne (*née* Batterbury) wife of Major F. H. Orr, R.A.V.C., a daughter—Meriel Joy.

SHENMAN.—On August 16th, 1954, at Scottsdale, N.E.S.M. Hospital, to Doreen (*née* Mount, M.R.C.V.S.) wife of George Shenman, B.V.SC. (SYD.), of Derby, Tasmania, a son—James Keith Lawrence.

ADDRESSES OF DISEASE-INFECTED PREMISES

This list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:

Derbys. 44, West Street, Beighton, Sheffield (Sept. 6).

Renfrew. Burnt Shields Farm, Burnt Shields, Kilbarchan (Sept. 8).

Atrophic Rhinitis:

Ches. Willaston Hall Farm, Willaston, Nantwich (Sept. 4).

Fowl Pest:

Norfolk Cobholm Allotments, Gt. Yarmouth (Sept. 7).

Swine Fever:

Ches. Mill Covert, Doddington, Nantwich (Sept. 6).

Denbighs. Maes-y-Droell Farm, Llanarman-yn-Ial, Mold (Sept. 6); Rose Cottage, Bonc Wen, Rhos, Wrexham (Sept. 7); Marchweil, Wrexham (Sept. 9).

Devon. Oakfields, Sampford Courtenay, North Tawton (Sept. 9).

Glouc.s. Hyde Dale, Minchinhampton, Stroud (Sept. 6).

Herts. Widfordbury Farm, Widford, Ware (Sept 6).

Lancs. Altys Farm, Marsh Brows, Formby, Liverpool; 530, Fleet Lane, St. Helens (Sept. 6).

Leics. Newlands Farm, Hungarton (Sept. 9).

Lincs. Nebrasca, Kirton Lindsey, Gainsborough (Sept. 6).

Norfolk Thorpe Buildings, Wretham Hall Estate, Wretham, Thetford (Sept. 8).

Notts. Greenhill Farm, Barnby Road, Balderton (Sept. 6).

Salop. Upper House, Alberbury, Shrewsbury (Sept. 7); 17, Moss View, Whixall, Whitchurch (Sept. 8).

Somerset. North Town Farm, North Cadbury, Yeovil (Sept. 6); Hornblotten Green, East Pennard, Shepton Mallet (Sept. 8).

Warwicks. Little Ladbrooke Farm, Pen Lane, Tanworth-in-Arden, Birmingham (Sept. 9).

Worcs. Manor Farm, Sherriffs Lench, Evesham (Sept. 6); Langabear Farm, and Inkford Lodge Farm, Alcester Road, Wythall, Birmingham (Sept. 7).

Yorks. Broomfield Farm, Elvington (Sept. 7).

ADVERTISER'S ANNOUNCMENT

Burroughs Wellcome & Co. announce the introduction of "Wellcome" brand Improved Black Disease Vaccine (*Cl. oedematiens* Vaccine, Alum-Precipitated) in containers of 50 c.c.

The dose is only 2 c.c. compared with 5 c.c. dose required with the previously issued anaculture.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

AMMONIUM SULPHATE POISONING

Sir,—We have had our attention drawn to risks of alleged ammonium sulphate poisoning, due to cattle grazing on recently dressed pasture. In view of conflicting reported data with preliminary experiments carried out at this laboratory, we should appreciate any pertinent facts, or personal experience, readers may have of the possibility of ammonium sulphate poisoning.

Priouzeau (1951) gives a vivid description of an episode where oil cake had been accidentally contaminated from two sacks of sulphate of ammonia kept in the shed where the rations for the cows had been mixed. Two cows died. Symptoms were severe colic, groaning, shivering, staggering, very forced rapid breathing, very marked jugular pulse and death after violent struggling and bellowing. There was a marked diarrhoea with blood. The skin showed numerous red and purple petechiae. Death occurred about 15 hours after ingesting the sulphate of ammonia.

On *post-mortem* there were numerous petechiae throughout the carcase. There were numerous large haemorrhagic patches on the m.m. of the rumen, reticulum, abomasum and intestines. The intestinal m.m. was very oedematous and ulcerated in places. The liver was enlarged, pale and friable. The blood was fluid, and lighter in colour than normal. Sulphate of ammonia was identified in the stomach contents.

Priouzeau carried out experiments on a cow and a heifer. The cow was given 150 grammes of sulphate of ammonia and the heifer 40 grammes dissolved in water. The cow died 12 hours later with symptoms and lesions identical with those seen in the poisoned cattle. The heifer died in 10 hours with the same symptoms and lesions. Experiments were also carried out with rabbits.

Our interest was aroused by a letter from Mr. O. V. Gunning to Mr. M. Crawford of the Common-

wealth Bureau of Animal Health. Mr. Gunning reported that he had been called to a case where dairy cows had consumed ammonium sulphate owing to manure drills having been cleaned out on a portion of the pasture. In this case five animals died, and the symptoms appeared similar to those reported by Priouzeau. A close investigation precluded any other likely source of toxic material other than ammonium sulphate.

We attempted to repeat the experiments of Priouzeau. A calf weighing 274 lb. was given a drench containing 50 grammes of A.R. ammonium sulphate. No symptoms or effects of any kind were noted. A week later we repeated the process on the same animal using 50 grammes of commercial salt with similar results. Two weeks later 200 grammes of A.R. crystals were given by a drench. Again no symptoms of any kind were observed and feeding was not affected in any way.

Yours faithfully,

J. L. McGIRR,
D. S. PAPWORTH,
W. H. PARR,

Ministry of Agriculture and Fisheries,
Veterinary Laboratory,
New Haw,
Weybridge, Surrey.
August 30th, 1954.

REFERENCE

PRIOUZEAU, M. (1951). *Rec. Med. Vet.* **127.** 287-295.

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A LEGITIMATE GRIEVANCE

Sir,—I have followed the recent correspondence on "A Legitimate Grievance" with great interest, being at present employed by a clinic and having formerly worked in clinics both whole time and on a part-time basis in private practice.

I am assured that one of the reasons for the multiplicity of clinics, particularly in this area, is that in wartime and in pre-war days there were very few private veterinary surgeons in the district interested in small-animal work and that the public had difficulty in obtaining treatment. The position has now altered, but the numbers attending clinics tend rather to increase than decrease.

The clinics score over the private practitioner in their freedom of advertisement and lack of proper almoning; also they can often give a better service than the private practitioner, as funds for equipment and drugs can all be gained by public appeals. While most veterinarians working in clinics are not particularly well paid, the hours and conditions of work are often better than those to be obtained in private practice, and the freedom of using drugs without the need to have quite such meticulous regard to the cost makes the work itself much more rewarding.

Against this there are the disadvantages of lay control, often by ill-informed people with little idea of the complexities of veterinary work and hygiene, and, frequently, the feeling that one is being made use of by mean people.

The day must come when in fairness to private practitioners a reorganisation and redistribution of clinics will take place. It would be to the advantage of the profession as a whole if many of these places could be converted into genuine animal hospitals run on the lines of the voluntary hospitals before the National Health Service, which would be used by the local practitioners, with X-ray, laboratory and nursing services attached. An isolation hospital for infectious cases, such as distemper, would be invaluable in urban districts; this system works admirably in some countries.

In my opinion the present position has been reached owing to lack of public relations work by the profession. The status—and scale of fees—of the veterinary surgeon in this country are still deplorably low. As "Veterinary Victim" suggested, the public know or care little about the length or cost of a veterinary surgeon's training. All they want is somebody who will cure their animals.

The B.M.A. have recognised the importance of fostering the right public attitude by the production of a medical magazine for laymen, *The Family Doctor*. I am sure a veterinary magazine run on similar lines and sponsored by the B.V.A. would meet wide support in this animal-loving country. It would, in some measure, counteract the propaganda of the charitable societies and the patent medicine advertisements by giving a true (and official) picture of veterinary work, and consequently raise the prevalent assessment of the veterinary surgeon's place in society.

Yours faithfully,

P. N. HUMPHREYS,

11, Chichester Terrace,
Brighton, 7.
September 5th, 1954.

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SKIN CONDITIONS IN THE DOG

Sir,—I found the clinical communication in THE VETERINARY RECORD of July 24th of Messrs. A. H. Hogg and H. Holroyd of great interest. I have observed both the skin conditions described, in a number of bull mastiffs and alsatians, but not in other breeds. One particular case (my own dog) I treated over a period of nearly a year without apparent success; treatment included local applications of various parasiticides and eczema lotions, also oral and parenteral administration of vitamins and hormones. In common with Mr. Henderson (*V.R.*, August 7th) I found benzyl benzoate emulsion appeared to improve the tail lesions after repeated applications.

It is now my practice not to attempt local treatment, but to prescribe a very high protein diet (and correspondingly low carbohydrate intake). In the majority of cases a complete cure is obtained in four to six weeks. Relapses are common when a low protein diet is reverted to.

Yours faithfully,

A. W. VAUGHAN,

The Stone House,
Ewhurst, Surrey.
August 31st, 1954.

ELECTRIC STUNNING OF ANIMALS BEFORE SLAUGHTER

Sir,—May I point out the importance of checking the voltage of the mains before stunning is attempted?

The energy calibration of the Elther apparatus (which is based on the assumption that the load resistance is 150 ohms) assumes that the actual voltage on the mains is the nominal voltage. In fact, however, on a heavily loaded feeder the actual voltage may vary considerably during the day. Hence the importance of having a voltmeter permanently installed and of checking its reading before stunning begins.

Yours faithfully,
C. W. HUME,

The Universities Federation for Animal Welfare,
7a, Lamb's Conduit Passage,
London, W.C.1.
August 31st, 1954.

THE COMMERCIAL EXHIBITION

The following brief description of the exhibits on their Stands have been supplied by those companies who have availed themselves of the propaganda facilities offered. The Exhibition of Surgical Instruments, Drugs, etc., is being held throughout the week in the Spanish Barn, Torre Abbey.

Allen & Hanbury, Veterinary Division

The main theme of the exhibit will be the use of combined therapy in veterinary practice as exemplified by the two products Dapsetyn and Entavet.

DAPSETYN, a combination of Chloramphenicol and Dapsone, takes advantage of the marked synergism existing between the two drugs to provide a product which is effective in the treatment of mastitis due to most gram-positive and gram-negative organisms.

ENTAVET, combined Streptomycin and Sulphaguanidine, provides a rapid two dose treatment for enteritis in animals, particularly calf scours. It is economical and convenient in use, and the presence of Sulphaguanidine minimises the possible occurrence of Streptomycin-resistant strains of organisms.

Veterinary Alficetyn (Brand Chloramphenicol) Eye Ointment, a specific for the treatment of infectious keratitis of cattle, and a range of penicillin and streptomycin products will also be exhibited.

A selection of surgical instruments for veterinary use and STERILON catgut will be displayed. One of the largest manufacturers of surgical instruments and equipment in this country, Allen & Hanburys Ltd. are introducing a complete range of high quality, stainless steel instruments for veterinary use. Initially, instruments and equipment for general and small-animal surgery will be available and later, instruments for large-animal surgery. A catalogue will be issued in two parts to cover each stage of the development; Part 1—Veterinary Instruments and Equipment for general and small-animal surgery—will be issued shortly.

Arnold & Sons Veterinary Instruments Ltd.

Amongst the exhibits are the Analgic Needles, Nylon Syringes at last available in quantity; a special card showing Samolene, the new Polyester Yarn, both braided and in tape form. Artificial insemination equipment is also shown and deep freeze containers, useful for the transport of semen with ice.

Instruments which have not been available for some time are presented. Amongst these are the McKenny's Tracheotome, a complete range of Roaring instruments and the Brayley Reynolds Roaring Retractor with illuminated fittings.

A new medical product is to be noted, namely, the Penicillin Teat Bougie, which has, of course, an entirely restricted sale through the veterinary profession.

Attention is drawn to the following altered addresses:—Messrs. Arnold & Sons, 1, St. Martins Lane, Micklegate, York. Messrs. Arnold & Sons, 13, Frederick Street, Edinburgh, 2.

Baillière, Tindall, & Cox, Ltd.

A full range of current veterinary books published in the United Kingdom and the U.S.A. is exhibited.

Particular attention is drawn to an advanced copy of a forthcoming new book, "Fertility and Infertility in Domestic Animals," by J. A. Laing, PH.D., B.SC., M.R.C.V.S. This is a first-class reference and text-book on this vitally important subject, covering not only cattle but also horses, sheep, pigs, and dogs. An essential book for every veterinarian, whether in large- or small-animal practice, in town or country, this new manual will be available in October, 1954.

Recent new editions of standard works on show include the new third edition of Major Hamilton Kirk's "Index of Treatment in Small-animal Practice," a companion volume to the same author's "Index of Diagnosis"; Hobday's "Surgical Diseases of the Dog and Cat," revised by Professor McCunn; McFadyean's "Osteology and Arthrology of the Domesticated Animals;" and Wright's "Veterinary Anaesthesia."

New books and new editions from the United States have included "Avian Physiology," a completely new and unique book by Paul D. Sturkie, Professor of Poultry Physiology at Rutgers University; Coffin's "Manual of Veterinary Clinical Pathology," third edition; and "Sheep Diseases," by I. E. Newsom, D.V.S., D.SC.

Baillère, Tindall, & Cox specialise in the publication and sale of veterinary books and periodicals, and their range is being extended continually in line with changes and developments in veterinary practice. A complete and up-to-date catalogue of all current veterinary books may be obtained on application at Stand No. 14.

Bayer Products, Ltd. (Veterinary Division)

Of particular interest on this year's Bayer stand is "Frumen" which introduces the latest approach to correcting ruminal disfunction in cattle.

"Frumen" presents the natural rumen contents from healthy cattle in a freeze-dried concentrated and stable form, suitable for adult cattle and calves. Equivalent products recently introduced in the U.S.A. have already proved their value in correcting ruminal disfunction following milk fever, acetonaemia, etc., and ensuring correct vitamin balance. In calves "Frumen" is employed to initiate and accelerate the development of natural rumen activity with reduced risk of scours and other intestinal infections.

The background of the Bayer exhibit is devoted to their established and comprehensive range of veterinary biologi-

cals, prepared under ideal conditions at the Bayer Biological Institute, Exning, Newmarket. The Institute, part of which is featured, has recently been redesigned and re-equipped to cope with increased production planned and to provide still better facilities for the continual veterinary research being carried out by the veterinary surgeons controlling the Institute.

The remainder of the exhibit covers some of the more recent chemotherapeutics such as " Hepmin," " Parabortine," " Roccal," and " Tycine."

Boots Pure Drug Co. Ltd.

The accent is on " service to the profession " on the Boots stand. Reference is made to the advantages arising from nation-wide distribution to the profession of most proprietary preparations, as well as drugs and Boots specialities, through one channel. Emphasis is placed on the advantages to be gained by means of the "one transaction" system.

This display is supported by examples of the Boots range of veterinary specialities, such as Penicillin Intramammary Suspension in the economy and dispensing packs, with own name labels where required. Tyrothricin Ear Drops, hormone products, " Cobastab " brand of vitamin B_{12} injection, and a new paste for the prevention and treatment of piglet anaemia are also on view, supported by literature.

Burroughs Wellcome & Co.

Prominence is given to a graphic representation of the parts played by Protormone and Lutormone in sex hormone therapy. Protormone is a new presentation of Progesterone and is indicated for the maintenance of pregnancy and for the treatment of cystic ovaries in the cow. The uses of Lutormone in the female and male animal are also described for various species.

Themalon, the new remarkable analgesic substance which is gaining a growing reputation in canine practice, is featured alongside Lethidrone, its companion product. The latter terminates the analgesic and hypnotic actions of Themalon (or of morphine and pethidine) with dramatic effect and leaves the dog alert.

Myxomatosis is now of special interest to veterinary surgeons in this country. Sure to arouse attention, therefore, is the display of the prophylactic vaccine, prepared in The Wellcome Research Laboratories, for use in domestic and laboratory rabbits.

Outstanding amongst the literature at the Exhibition is the attractive folder specially designed by B. W. & Co. for the Congress and distributed to all veterinary surgeons before the opening date. As in previous years the folder features the products to be displayed at the Exhibition, gives details of places of interest in and around Torquay, and provides a small scale map of the borough.

Chappie Ltd.

Chappie Ltd., animal food manufacturers of Melton Mowbray, have provided a stand which will be of particular interest to B.V.A. members. The central feature is a frozen food display cabinet in which are shown fresh and processed samples of the raw materials—meat, fish, liver, etc.—used in the production of the Company's products " Lassie," " Chappie," and " Kit-E-Kat."

Many veterinary surgeons—especially those who visited the Company's production plant during their student days—will know R. Gordon Booth, B.SC., PH.D., F.R.I.C., F.Z.S., Director of Research and Development, who attends the stand to explain the work of his department in establishing, maintaining and improving where possible the high nutritional standards and consumer acceptances required for each product.

Photographic panels, depicting various aspects of the plant at Melton Mowbray, vividly illustrate the vitality of a rapidly expanding industry which is contributing in no small measure to the improved feeding of the nation's pets.

W. Gimber & Sons Ltd.

Amongst many items of special interest will be a new type of parturition gown together with footwear suited to veterinary practice.

Also displayed will be a complete range of record syringes by Hauptner, the latest " Oxygen-Ether " veterinary anaesthesia set, " Vim " brand hypodermic needles, and a new electric steriliser. Both Mr. W. S. Gimber and Mr. D. Arter will be in attendance, and it is hoped that the stand will prove interesting to all those visiting the exhibition.

Glaxo Laboratories Ltd.

Prominently displayed among the newcomers to the Glaxo veterinary range is Intradex, the blood volume restorer for shock, haemorrhage and dehydration. Then comes Streptovex, the new Glaxo preparation of *oral* Streptomycin. Streptopen Uterine Tablets too, have their place, for these provide a convenient (and often specific) treatment for genital infections of mixed bacterial origin. Due regard is also paid to the new Glaxo high-potency cerate—Procaine Penicillin 300 Veterinary Cerate *Glaxo*. Here is a cerate that gives significant levels for up to seven days . . . that is particularly useful, too, for prophylaxis against summer mastitis.

Vitamin B_{12} is well represented by Veterinary Cytamen—now playing an important rôle in restoring appetite, vigour and bloom to " classic " and convalescent animals. Among the other products to be seen on the Glaxo stand are Crystapen for Injection—bactericidal penicillin; Mylipen—the ready-to-use prolonged action penicillin; and Benapen—the new Glaxo penicillin giving effective levels for up to four days.

Hauptner Instruments and Equipment shown by Brookwick, Ward & Co.

Apart from the normal range of veterinary instruments the following appear of particular interest:

A model, a third natural size, of a cow and a life size model of an udder, both of which take apart to show considerable anatomical detail.

Delegates may inspect the new type calving chains, recommended by Dr. Goetze. An English summary of a descriptive article about these chains will be available.

Blendinger's rumenotomy set, which dispenses with the use of a rigid frame by using gripping forceps with hook attachments, will also be demonstrated.

A simple meat testing outfit, recommended by the Hanover Veterinary College, will be of topical interest.

C. J. Hewlett & Son, Ltd.

The display of veterinary specialities and instruments includes the McLintock Automatic Injector. This instrument can be used as a hypodermic syringe for multiple injections, as a pump attached to a Nielsen's catheter for intra-uterine irrigation, or as a drenching gun. The McLintock Pre-set Syringe for Tuberculin Testing and the instruments for the McLintock technique in rumenotomy will also be shown.

Special preparations of particular interest include:—

Calcium Boro-Gluconate P., P.M., and P.M.D., for the treatment of milk fever.

Tympasil, containing methyl silicone, aliphatic hydrocarbons, and Ol. pini sylvest., a modern treatment for frothy bloat by means of surface acting agents.

Duo-Phos, containing 20% dextrose with double phosphates for hypophosphataemia and acetonaemia.

Probactol, containing phthalylsulphacetamide and sulphadimidine for white scour in calves, swine dysentery, diarrhoeas and dysenteries of the cat and dog involving *B. Coli* and for secondary enteric infections in canine distemper

I.P.S. brand Penicillin Sulphadimidine for cases of bovine mastitis where the infecting organisms are mixed streptococci complicated by a secondary pathogen (except *C. pyogenes).*

Shown for the first time will be Stenediol (methylandrostenediol) for the promotion of growth and the reconstruction of body tissue.

Imperial Chemical (Pharmaceuticals) Ltd.

The discovery of an entirely new type of antibacterial compound is announced by Imperial Chemical (Pharmaceuticals) Limited, at this year's B.V.A. Congress Exhibition. This latest I.C.I. research achievement, originally known as Compound 10040, has now been given the name "Hibitane." It is still undergoing widespread clinical trials in both human and animal medicine, and these investigations have already revealed its remarkable antibacterial properties. The new compound will first be available to veterinary surgeons as an intramammary cream for the treatment of mastitis, and as an effervescent pessary for uterine infections. There is also " Hibitane " Obstetric Cream, a medical preparation with equally valuable uses in veterinary practice.

A special " Hibitane " product, to be known as I.C.I. Udder Wash Concentrate, will soon be available to the farmer. Controlled farm trials over the past three years have strikingly demonstrated its effectiveness in preventing the spread of mastitis.

Two other important I.C.(P) products are also being displayed. The anaesthetic for farm animals, " Anavenol " K, is now available as a convenient *solution,* ready for immediate use; and the new lower prices for " Sulphamezathine " are announced. The constantly increasing demand for this all-purpose veterinary sulphonamide has enabled these important price reductions to be made.

The International Serum Co. Ltd.

This stand shows a comprehensive range of antisera, vaccines and toxoids. Of particular interest are " Caninovac " brand of canine distemper vaccine—egg adapted (Living) and " Erysorb " brand of swine erysipelas vaccine A.T., both products of the Behring Works, Marburg, Western Germany. These products have proved increasingly popular with the veterinary profession. The swine erysipelas vaccine A.T. is Government tested in Frankfort/Main and contains 20 protective units per c.c. It is a purified product containing the maximum effective immunising substances, whilst the foreign protein has largely been eliminated.

The introduction of an improved trypsin-activated, concentrated pulpy kidney vaccine is announced, supplies of which will be available shortly.

" Avirulin " brand of swine erysipelas vaccine (avirulent) is proving equally popular for immunisation against swine erysipelas. This vaccine is more easily injected and assimilated than the A.T. vaccine and gives a very satisfactory immunity.

" Cispidon " brand of dioxyanthraquinone, prepared by the Farbenfabriken Bayer, Leverkusen, Germany, is an ideal purgative for use in all domestic animals.

Kodak Ltd.

Two outstanding new items of Kodak equipment on view on the stand are the Kodak Processing Unit Model 30 and the Kodak Drying Cabinet Model B.

The Kodak Processing Unit Model 30 is a compact and inexpensive 3-gallon model which has been specially designed for processing small quantities of radiographs. It has an output of up to 30 films per hour. The unit is divided into two parts, a water jacket and a wash compartment. The water jacket holds three hard rubber tanks each of 3-gallon capacity and incorporates a rinse compartment. The temperature of the water in the water jacket is thermostatically controlled, The wash compartment will accommodate ten hangers of all sizes up to 14 inches × 17 inches. A back panel is available as an accessory.

The Kodak Drying Cabinet Model B is very suitable for use with the Kodak Processing Unit Model 30. It is small enough to stand on a bench in the workroom. It can be used to dry X-ray films, plates, sheet films, roll films, and miniature films. An electric fan over an 800-watt heater circulates warm air throughout the cabinet.

In addition there will be a collection of radiographs and prints of animal subjects. Kodak staff will be on hand to answer questions and discuss any aspects of medical radiography.

Minsal Ltd.

In the section for cattle five supplements are offered: Cattle Minsal, Fortified No. 1 Magnesium Rich Supplement, Fortified No. 2 Cattle Minsal (High Manganese and Copper), Fortified No. 3 Cattle Minsal (High Magnesium, Manganese, and Copper), Trace Elemented Phosphate (T.E.P.).

A full range of supplements for sheep, pigs, poultry, and horses are also shown. A new supplement for pigs, namely, XF Minsal, is displayed.

With regard to mineral licks, all five grades of supplement for cattle, and also the sheep supplement, are offered in lick form, in circular and rectangular shapes, thus showing that it is possible to obtain complete mineral supplements in this form, which is quite different from the more orthodox mineral lick which consists essentially of salt. A special feature of the Minsal licks is that they are treated to withstand adverse weather conditions.

Full trace elemented minerals for pigs and poultry containing stabilised procaine penicillin are also offered.

A new product called Minsal Nuts is exhibited for the first time. These Nuts are highly fortified with the appropriate mineral supplement.

Ortho Pharmaceutical Ltd., Veterinary Division

Ortho Pharmaceutical Ltd. are exhibiting Dinovex—a new subcutaneous injectable aid to sub-fertility in cattle, developed by workers in the Animal Industry Division of the Ortho Research Foundation under the direction of Dr. Victor R. Berliner.

Dinovex is a sterile non-pyrogenic, non-toxic solution of the synthetic oestrogen dienoestrol in a base that promotes rapid absorption from the site of injection. Its mode of therapy is supplementation of insufficient ovarian oestrogen production *during* oestrus, threby stimulating the maturing follicle to induce ovulation and corpus luteum formation. Dinovex differs from other gonadotrophic supplementation therapy in that it supplies oestrogen during oestrus and is not a heat producer and does not rely upon stimulation of the pituitary. Dinovex aims to supply a rapidly absorbed and rapidly excretable oestrogen directly to the ovary, inducing ovulation at the time of service. This mode of therapy reduces risk of ovarian over-stimulation resulting in multiple births, follicular cysts and persistent corpora lutea. Early field tests appear to justify widespread use of the product as a realistic and inexpensive contribution to breeding economy.

Parke-Davis & Co., Ltd.

The staff of the Parke-Davis stand look forward to meeting old and new friends during Congress Week. Pride of place on the stand will be given to the range of special veterinary packs of Chloromycetin introduced last year. This broad spectrum antibiotic has enjoyed considerable success in the treatment of animal diseases, due to gram-positive and gram-negative bacteria, rickettsiae, and some of the larger viruses. A recent addition to the Chloromycetin range—Chloromycetin intramuscular—will be shown. This new product considerably increases the scope of Chloromycetin therapy for large animals. It is supplied in rubber-capped vials containing 2g microcrystalline Chloromycetin for use as an aqueous suspension by deep intramuscular injection.

On that section of the stand displaying antihistamine preparations—Benylin Expectorant, Caladryl Lotion and Cream, and Benadryl Capsules and Parenteral, special emphasis will be given to a new 50 c.c. multi-dose package of Benadryl Parenteral. This new package size represents a particularly convenient form of antihistamine therapy for large-animal practice.

The exhibit will include Abidec vitamin preparations, the anticonvulsant Epanutin, and other Parke-Davis veterinary specialities.

Pharmaceutical Specialities (May & Baker), Ltd.

The exhibit comprises the following:—

" Anthisan " brand mepyamine maleate, " Phenergan " brand promethazine hydrochloride, and " Dibrogan " brand dibromopropamidine and promethazine cream; for the conduct of oral and topical therapy where antihistamine preparations are indicated. The two forms of " Protegan," *i.e.*, with and without penicillin, and supplied in tubes suitable for intra-mammary administration, are also shown. " Protegan " is dibromopropamidine with sulphathiazole. Sulphonamides are represented by the triple association of sulphamerazine, sulphadiazine, and sulphapyridine which is marketed under the brand name of " Trinamide," and " Compron " brand compressed sulphanilamide/sulphapyridine products for the treatment of uterine conditions. " Solcon," " Otoryl," and " Euthatal " are recent additions to the Company's veterinary list, and are shown for the first time. " Solcon " moulded products contain dibromepropamidine and streptomycin, and are used in the local treatment of infective conditions of the prepuce of the bull and the uterus in the cow. Infections of the female reproductive organs in the sheep and the pig are also indications for " Solcon." " Otoryl " brand ear-drops contain dibromopropamidine, promethazine, and gamma benzene hexachloride, and are an effective form of treatment for otitis media in dogs and cats. "Euthatal" provides a means for the conduct of euthanasia in small animals and consists of a more concentrated solution of pentobarbitone sodium B.Vet.C. (each c.c. contains gr. 3 of the drug).

A further interesting feature is a small exhibit showing the uses of X-ray contrast media in veterinary radiography, and urograms and myelograms obtained with " Uridone " and " Neo-Hydriol " are shown.

Watson & Sons (Electro-Medical) Ltd.

The portable X-ray apparatus type MX-2 is an extremely powerful, compact, and robust unit which has proved to be ideal for the majority of veterinary requirements.

The shockproof tube-head has an output of 80 kVp. at 15 mA., and in addition to radiography it can be used for prolonged screen examinations. The tube-head support is mobile and can be collapsed readily for transport by car.

A number of interesting radiographs demonstrating the value of X-rays in veterinary practice are displayed. Some of them were taken with the Watson portable type MX-2 and others with more powerful equipment including the 120 kV. apparatus at the Equine Research Station of the Animal Health Trust.

Willington Medicals Ltd.

The main feature of the stand is the new comprehensive price catalogue which has recently been distributed throughout the country. In addition a selective range of products is displayed, including new modern packs and labels. Together with these are a complete range of sera and vaccines, preparations of the British Veterinary Codex, bulk drugs and chemicals, proprietary products, veterinary instruments and surgical sundries.

A specialised service is available for products packed with individually named and addressed labels.

A portion of the stand will display Ethical Veterinary Products of Consolidated Chemicals Ltd. These are modern formulations including Actos—A.C.T.H., Hepacon B Forte, and other injectables.

Willington Medicals Ltd., have a strong veterinary connection throughout the British Isles, and are specialists in supplies for both large-animal and small-animal practices. Their business is confined solely to meeting the requirements of the veterinarian.

Willows Francis Pharmaceutical Products Ltd.

In the expectation of meeting many old friends—and forming new friendships—Willows are well represented at the exhibition. The stand this year is a departure from earlier efforts in that the company is featuring a small selection of veterinary specialities rather than a complete range of heterogeneous products. Xylotox veterinary is the central theme—the most outstanding addition to local anaesthetics since the introduction of procaine. Attention is also centred on such well-known specialities as rumoxane, sulphentrin, arbunox, kebovel, etc. An interesting display of instruments is also on view—a token representation of the comprehensive range of veterinary instruments which are available to the profession.

A small section is devoted to biologics, especially those for pigs and sheep.

John Wyeth & Brother Ltd.

On this stand is introduced a new penicillin preparation, " Penidural " All-Purpose, which creates, with a single injection, high initial and prolonged serum penicillin levels.

One single-dose, rubber-capped, vial contains 600,000 units Benzathine Penicillin, 300,000 units Potassium Penicillin G, and 300.000 units Procaine Penicillin G, and with the addition of 1·5 c.c. Water for Injection, B.P., thorough shaking is all that is required to prepare the injection for immediate use.

The Potassium Penicillin creates high blood levels for the first four to six hours, Procaine Penicillin retains moderately high levels for the succeeding 18 to 24 hours, and the Benzathine Penicillin maintains an effective serum penicillin blood level for more than four days.

A *single* injection, will generally suffice in the treatment of infections caused by penicillin-sensitive organisms, particularly those in which pneumococci, streptococci, most staphylococci, clostridia, corynebacteria, leptospira, anthrax bacilli, and erysipelothrix rhusiopathiæ are implicated. This includes such diverse conditions as pyelonephritis, metritis, and acute complications of mastitis.

" Penidural " Long-Acting Injectable, a ready-to-use valuable time-saver, is a new, unusually long-acting, repository penicillin to be administered by deep intramuscular injection. It is available in 10 c.c. multiple-dose, rubber-capped, vials, each c.c. containing 300,000 units of Benzathine Penicillin, capable of producing assayable blood levels for at least seven days following a single injection.